After Action Report:
DMAT PA-1 Strike Team, Hurricane Katrina

Wednesday, September 14, 2005

Note 1: this report is available in PDF form with clickable links, email Dr. Conover for an electronic copy if needed.

Note 2: this report was put together under great time pressure. We apologize for the resulting errors, omissions, awkwardnesses, and lack of tact.

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DMAT PA-1 was requested to provide a detailed after-action report with specific recommendations regarding use of Strike Teams, based on our extensive experience during and after Hurricane Katrina. This report is a consensus of all the members of the DMAT PA-1 Strike Team. It focuses primarily on ways to improve the use of Strike Teams in future operations, and was requested to be as detailed and specific as possible by Lew Raeder and Gary Lindbergh of FEMA.

The PA-1 Strike Team was deployed to the Gulf coast of Mississippi, based with a full two-DMAT tent hospital at the closed Hancock Medical Center, and missions ranged from Pearlington along the Pearl River that forms the Louisiana/Mississippi border, to Pass Christian just west of Gulfport. Our area consisted of urban areas, rural areas, and small towns. This differed significantly from the experience at the New Orleans airport or Baton Rouge, and information should be gathered from those areas. Nonetheless, PA-1's experience and recommendations are applicable to many future disasters.

As a top-level recommendation, we endorse the idea of Strike Teams and suggest that FEMA and individual state DMAT teams consider additional specific preparations for selecting, training and equipping Strike Teams as a primary response method to disasters. Of the many recommendations below, one stands out as a critical need:

Critical recommendation: Mutual aid from Virginia Department of Emergency Management for an ICS overhead team to fulfill Operations and Plans Section duties, to be sited at the DMAT hospital where Strike Teams are based. (See below.)

Intelligence

Observations:

- Several times our entire Strike Team functioned as a scout, for instance, checking rumored newly-opened retail pharmacies. This could have better been accomplished by a scout team in one vehicle. For example, FPS Officer Marty Longo and DMAT member Keith Conover went together to the new EOC location one afternoon to confirm the location.
- Much of the information we heard about shelters, pharmacies, and road conditions was incorrect.

Recommendations:

- The Plans section at a DMAT hospital should be expanded and used to gather and disseminate intelligence.
- The Plans section should make up tasks for small (e.g., 2-person) scout teams, specifically to acquire and develop and do on-site inspections to develop appropriate intelligence about the surrounding area.

Strike Team Base

Observations:

- Several Strike Teams a day were being sent out from the joint DMAT MO-1/FL-1 hospital at Hancock Medical Center, but, the ICS Operations and Plans functions were, due to personnel shortages, minimally staffed. In reality, sending Strike Teams out, tracking them, generating tasks, and monitoring completion is very similar to search and rescue operations that use a Status Map, Strategy Map, Task Assignment Forms, Tracking Logs, and for this size operation, usually two personnel per shift completely dedicated to managing the teams going out and returning.
- The command staff for the DMAT hospital were essentially hospital administrators, overwhelmed with the details of a disaster hospital, also asked to "on the side" run an ICS operation with mobile teams.

Recommendations (Critical):

1) **At the hospital where Strike Teams are based, there must be Strong Operations and Plans Sections, with an appropriate number of appropriately-trained personnel dedicated to managing the Strike Teams sent out.**
2) **In particular, the Operations Section should:**
   a) **Issue Task Assignment Forms and maps with specific assignments to each Strike Team when they go out.**
   b) **Make sure that Strike Teams check in regularly and have not gotten into trouble.**
   c) **Take reports from Strike Teams while in the field, debrief them on return to the Base, and collate the intelligence (e.g., open pharmacies, road conditions, GPS coordinates for various informal shelters, hazards and other teams in the vicinity), and making it available to the Plans Section and others in Base and the other Strike Teams.**
   d) **Make sure that there is good information transfer between different agencies.**
3) **If a Strike Team hears rumors about concentrations of populations at need, this should be reported back, in real-time, via reliable communications.**
4) **Operations and Plans Sections should both have stable, secure areas, prominently identified, and physically staffed at least two shifts/day for the size of the operation at Hancock Medical Center; estimate a team of five to staff this as needed for the Strike Team operations at Hancock Medical Center during the first week.**
5) **If necessary, a Division Supervisor or DMAT Hospital Commander should use a Strike Team's personnel to provide the needed Ops and Plans Section staff (provided the members have this training) to coordinate other Strike Team field operations.**

6) **To support this, Strike Team members should be fully trained in ICS at the ICS-200 level with additional training in operational management of small teams sent into the field, particularly as provided by classes such as Managing the Search Function, Managing Search Operations, and Practical Search Operations.**

7) **As an interim measure, until NDMS can develop in-house talent to manage Ops and Plans Sections dealing with Strike Teams operating out of a base: contact Mark Eggeman, Search and Rescue Coordinator for the Commonwealth of Virginia, to provide SAR "overhead teams" trained in the very similar tasks used during large multi-agency lost person searches. Mr. Eggeman can be reached at Mark.Eggeman@vdem.virginia.gov; 804 674-2732 (w); 804 840-0536 (cell) An alternative would be to request such assistance through the Boise Interagency Fire Cache. Although Urban Search and Rescue is ESF-9 and DMAT is ESF-8, this "search and rescue"—and in this case wilderness search and rescue expertise, is precisely what is needed within ESF-8. Please also note that the specific expertise needed is found primarily in the Virginia search and rescue office, which trains, tests and certifies individuals to perform these tasks.**

8) **This will help prevent such problems as two Strike Teams from different centers sent to the same shelter at the same time, and in general make sure that the distribution of Strike Teams is appropriate to the needs of the various communities and shelters in the region.**

Pre-Deployment Preparation

Potential Strike Team Missions/Roles

Observations:

We performed the following tasks:

- Provide wound care: treating infected wounds, performing delayed primary closures, debriding ulcerated wounds (e.g., diabetic ulcers), incising and draining abscesses.
- Went to shelters to do "sick call," but found few patients as it is difficult to spread the word to those in outlying areas without advanced notice. Announcing a "sick call" a day or so ahead increased the number or patients at some locations by ***twelve***-fold.
- Treat exacerbation of chronic medical conditions.
- Do medication checks, refills, substitutions, and adjustments based on findings such as degree of pedal edema, glucometer readings: basically, primary care.
- Provide tetanus immunizations.

Gather public health: information for epidemiologists, inform public officials and residents about basic public health measures, put up signs for handwashing and chlorinating water.

Recommendations:

Things we now think we should have been doing from the outset:

- Put up stickers, such as those provided by the Pennsylvania Department of Health, which are amusing and entertaining but still emphasizing the need for handwashing.
- Place Mr. Yuck stickers on hazardous materials at shelters, e.g., cleaning solutions.

- Visit a shelter and set up a time, a day or so hence, for a "sick call." It turns out that it took a day or so to get word to most of the survivors in a community, so just arriving and announcing a sick call was not very effective. In particular, Pearlington, MS had a traditional barbecue, with delta blues music playing, and offering haircuts, at the time we scheduled a "sick call" visit—very effective at getting people to the fire station for sick call; should have suggested something like this to the other locations we visited.

- Stage several seasoned Strike Teams in southern parts of Florida and/or Texas ahead of the hurricane. After the hurricane passes, these teams could be inserted by helicopter at hospital locations in areas believed to be hardest hit. These strike teams would be self-sufficient and outfitted with every means of communication including satellite phones, cell phones, FRS/GMRS radios, government encrypted walkie-talkies, and HAM radio for the purpose of gathering and disseminating information. They would incorporate into the hospital triage and quantify patient care needs. The hospital would be a natural point for patients to congregate and even a hospital rendered non-functioning by a storm could be plundered for medical supplies.

- Note: staging Strike Teams toward the southern extremes in the case of a northerly moving hurricane allows the team to be moved in immediately after the storm passes, because it passes the strike team before it hits the mainland. Alternately, staging the team inland in northern MS, for example, means that the crew cannot safely move in to the damaged area until much later after the storm passes their inland location.

- In the early stages of the disaster, information gathering is critical. Getting input from other agencies such as search and rescue to identify areas in the community that had been evacuated and did not need our services or where there were many found injured that did need our help. This could be done each evening, perhaps on a controlled-access web site where info could be posted on an electronic bulletin board. Shelters, Fire Stations, Churches, Schools, or other points of patient contact could be listed. This would require Internet access but our new stock of M4 satellite phones should enable this, even for Strike Teams.

- Because needs can change overnight, each morning, a two-member team could be sent out with FPS protection to review the areas needing Strike Team attention. They could confirm needs in an area and provide limited treatment only to life-risks. These scout teams would communicate back to the base to schedule a full Strike Team of 5-10 healthcare providers (plus FPS protection) to the areas with the most urgent needs. Information about needed medications or treatment supplies also could be communicated from the first group to the second group. The first group could post a sign announcing the planned visit that day with an approximate time.

Composition and Management of Strike Teams

Observations:

- Our Strike Team was kept together as a unit the full term of our deployment. Our team developed an esprit de corps and tight relationship that resulted in a rapid ramp-up in overall effectiveness and efficiency.

- Some of our team members had multiple skill sets to bring to the team. Our Nurse Practitioner is a prehospital R.N. with a multiple-generation family tradition of military and police service and training. Our physician has decades of mountain/cave rescue and large-operation search management experience, and is an ex-National Park Service Ranger. One paramedic is a doctoral level chemical engineer with years of experience in water

purification. Another paramedic is a HazMat technician and ex-police officer cross-trained in NDMS communications—and three of our team are radio amateurs ("hams"). Three of the team members have a strong wilderness recreation background (climbing, backpacking, whitewater kayaking). Two of the team members are trained as CISD peer debriefers, one by Dr. Jeff Mitchell himself, and one even co-authored a chapter with him on applying CISM concepts to wilderness search and rescue.

- We began working with a pair of Federal Protective Service officers—Deross "Dee" Polehill and his partner Marty Longo—and after we had developed a close working relationship, Sgt. Polehill assigned himself and Marty to us on a permanent basis. The trust in this relationship was a significant factor in sustaining the team's mental health.
- The sole operational problem with our team (at least that was brought to management's attention) was after losing "our" FPS officers—Dee said he had to assign himself and Marty, as the most experienced officers, to another Strike Team with potentially severe interpersonal and compliance problems.
- Our team found being staged at the MST much more stressful, both physically and mentally, than being in the field.

Example: After going to bed at about 2300 hours, our team leader was awakened at 2400 hours and summoned to drive from the barracks to the MST for a meeting to prepare the team for possible air insertion; the team was to repack all their gear in suitable form for air insertion (less than 70 lbs/person) and be at the MST at 0400. However, the winds were such that there was no possibility of immediate air transport—which could have been easily ascertained by viewing a weather report of winds aloft for the day. The team was finally dispatched by ground at 1800 hours, 14 hours later, after a few short cat-naps in the MST building—and this for a "six-hour" drive to Camp Shelby that actually lasted until 0500. Our team was driving in a convoy, severely sleep-deprived, which was by far the most hazardous portion of our deployment.

Recommendations:

- The ideal Strike Team would consist of a fully-armed Air Force PJ pararescue[1] or Navy SEAL team, that can be inserted by a high-level air drop into any situation, completely self-sufficient for five days, with all members cross-trained as mountain rescue team members, Military Police, emergency physicians, critical care physicians, primary care physicians, Emergency Department and critical care and primary care nurses, pharmacists and communications specialists, so that any team member can assume any role. Such a team is unrealistic and could never be assembled—but, at least ***stating*** the composition of an ideal team is useful.
- Even given the constraints of available personnel's capabilities, we should still ensure that Strike Team members are cross-trained in as many specialties as possible. Top choices for Strike Team members would include:
    - Physicians or nurses who are cross-trained in communications, or a pharmacist who is also a paramedic.
    - Those with wilderness search and rescue training (judged by Mountain Rescue Association, National Cave Rescue Commission, National Association for Search and Rescue or state search and rescue certifications).

[1] Air Force PJs ("purple berets") are squads from the Aerospace Rescue and Recovery Service who, for example, rescue pilots shot down behind enemy lines. In addition to medical and rescue capabilities, they are also elite fighting units.

  - Those with extensive communications experience (e.g., radio amateurs = "hams").
  - Those with previous experience with disaster deployment and competent within their areas of expertise.
  - Physical fitness and ability to withstand very severe austere conditions.
  - Good common sense, able to carry out multiple tasks simultaneously, and work independently.

- Strike Teams need strong austere-environment capabilities.
  - Those with outdoor backgrounds, particularly hiking or climbing, are likely to have (and know how to use) lightweight personal equipment effectively in a variety of environments, and should be sought after and specifically identified when trying to assemble Strike Teams.
  - Team members should carry with them everything needed to be self-sufficient: tents/hammocks, lightweight sleeping pads and sleeping bags, lightweight but tough outdoor clothing suitable for a variety of weather and terrain.
  - Given the similarities of DMAT Strike Team operations to wilderness search and rescue, all members should be trained at least at the awareness level in wilderness search and rescue, and given they will often be working in an urban environment, should have a similar background in urban search and rescue.
- Given this desire for multiple qualifications, it should be possible to develop standards for Strike Teams, and then we could, for example, talk about Level 1, 2, or 3 strike teams. We could also develop an online and practical curriculum for training to the different levels, after coordinating with USAR, wilderness SAR, and other appropriate experts.
- DMAT teams could develop rosters of potential Strike Teams, and based on the number and qualifications of individuals, list whether they could provide different levels of Strike Teams (e.g., one Level I and two Level II Strike Teams.)
- If Federal Protective Service (FPS) officers are assigned to a Strike Team, it would be best to embed a pair of officers with the team, so they become part of the team.
- We should preplan for the possibility of "double" teams where two Strike Teams are combined. When possible, teams with members whose cross-training complements the other team should be paired.
- Psychological Aspects and Leadership:
  - If strike teams are combined, management ***must*** arrange for a unified command structure where unity of command is preserved. There must be unquestioned lines of authority.
  - Interpersonal interactions are important. A team is not composed of interchangeable parts; once the team gets up to speed, a good team is much more than the sum of its individual members. Managers should do all they can to keep effective teams together and intact. Strike Teams should practice in austere and stressful environments, not only for the benefits of training in a realistic the environment, but to also develop team spirit prior to deployment.
  - Having the team eat together, bunk together and recreate together aids in developing team esprit de corps and effective teamwork.

- Strike Teams potentially provide a more stressful environment than a DMAT tent hospital. Therefore, when choosing Strike Team personnel, we should aim for those who are:
  - "hardened" to austere environments (e.g., those who camp/hike/hunt/climb and who actually seek and enjoy the austere environment),
  - "hardened" to situations with multiple conflicting demands, and the need to triage and prioritize such demands (e.g., those who work in a busy Emergency Department, those who manage large searches or lead search and rescue teams, or those who in their fire, EMS or police work often deal with such situations), and
  - able to maintain a calm and pleasant attitude in psychologically stressful situations, and able to work well with others in a team environment. (We think our team did quite well in these respects, but did see some signs of fairly severe stress in some of the other Strike Teams.)
- Strike Team leaders should do their best, despite the situation, to manage the team in a "low-adrenaline, low-testosterone" manner that will allow the team to continue functioning at a high level for weeks. During Katrina, our methods to maintain this attitude included long lunch stops in the shade with ample opportunity to relax and rehydrate, and occasionally taking a few minutes out to take pictures along the roadside, or stop along a rural road to feed and comfort a stray dog until local animal control authorities could bring him to an animal shelter dog-feeding center.

- Fatigue:
  - All Strike Team members (and perhaps all DMAT personnel) should be trained in fatigue assessment and management at the awareness level through a class based on *Fatigue: Sleep management during disasters and sustained operations* or a similar class.
  - All FEMA management personnel should be trained at least at the awareness level, and perhaps at the instructor level, with the above material, as well as other D.O.T. training on sleep deprivation and drivers of motor vehicles.
  - All FEMA management personnel should consider well-rested personnel as a precious commodity to be conserved, should be aware of the dangers of sending personnel under their command to drive while sleep-deprived, and should exercise good stewardship, spending this resource only when it contributes to the mission, and should resist pressures from above that tend to squander this resource.

Medical Equipment and Essential Supplies: Team Gear

Observations:

- Given the missions we were assigned, and what we found in the field, the Thomas Packs, Oxygen packs and LifePack boxes were, to some degree, both inadequate and unneeded for the tasks at hand.
  - The Thomas Packs would be good for two patients from a car wreck far from a hospital. But for handling a small community with multiple medical and surgical needs, more is needed.
  - The wound care kit was minimal; see list below for more suggestions.

  - The adult and pediatric BP cuffs (the adult cuff which, by the way, was missing from our Thomas Pack as issued) were useful, but also, especially in the South, need a large adult cuff and a thigh cuff.
  - The glucometer was useful, but not enough lancets.

- When we started going to shelters, we tried to obtain patients' medication lists, then take them to the DMAT pharmacy, fill them, and take the medications back the next day. This was only about half effective: only half of the patients for whom we had filled prescriptions were there the next day due to being relocated further from the disaster area.
- We rapidly realized that it was ***much*** better to carry a mini-pharmacy with us (see Appendix A). We substituted medications as appropriate, and also cut down on patient's diuretics and diabetes medications due to the increased heat exposure and lack of food.

Recommendations:

- Suggested modifications to existing Strike Team kit:
  - Instead of defibrillator/monitor, consider one of the more capable AEDs.
  - Glucometer: carry 100 lancets rather than 8.
- Additional equipment and supplies needed:
  - Inverters: each team should have two small inverters to plug into vehicle to run AC chargers.
  - Pharmacy:
    - Medications: See Appendix A.
    - Since we need to carry around a miniature pharmacy, good packaging is essential. Our use of three cardboard boxes that had held MREs was suboptimal. (We requisitioned meds from the DMAT hospital pharmacy.)
    - A better option would be a kit such as the Field Medical Unit made by North American Manufacturing Corporation, Scranton, PA; contact: LTC (ret) A. Joseph Albert, 570-342-8202, jsphalbert@hotmail.com. Such kits could be prepacked with the medications recommended in Appendix A.
    - Gatorade and Oral Rehydration Solution (ORS) or Ricelyte in bulk should be part of team med supplies.
    - Ziplock bags (small) and permanent markets (e..g, Sharpies) for dispensing meds—could be stored in the kits mentioned above.
    - Small paperback PDR.
  - Laminated stress management card (1).
  - Office supplies:
    - page protectors
    - grease pens
    - pens
    - index cards
    - notepads

- aluminum forms-storage clipboards (2) with waterproof paper
- duct tape
- small stapler
- thumbtacks.

- Water:
  - In addition to bottled water, teams need to be able to meet water needs if they run out.
  - See the article Water Disinfection Update: Mixed Oxidants. Dr. Conover adds "Since I published this article, I have decided that a filter should also be used, both to remove particulates and to allow pumping out of shallow streams or other water sources. To save weight I chose the Mountain Safety Research (MSR) SweetWater Microfilter, along with a MSR prefilter. Pumping into a lightweight Platypus flexible water bottle allows collection of water that can then be put in 2.5 gallon team water bladders and treated with the MiOX unit. This should reliably prevent any waterborne infections, but judgment is needed to avoid chemical and radiological contaminants."
  - A combination of the following provides a complete water purification and storage system for a team stranded without bottled water, is inexpensive (~$250) and weighs less than three pounds. Adding a shower attachment for the Water Sack and Pillow also allows team showers.
    - MSR MiOx unit.
    - MSR SweetWater Microfilter
    - MSR SweetWater Siltstopper prefilter
    - Platypus Filter Link to attach Microfilter to Platypus collapsible water bottle
    - Platypus 2 liter collapsible water bottle (this and all above available from www.rei.com)
    - Several 2.5 gallon polyethylene-lined nylon water bladders (Water Sack & Pillow, Item Number: 22311 from www.campmor.com)
- Team shelter:
  - Lightweight backpacking tents, mountaineering type for high winds, sufficient for the entire team plus gear which ideally can connect together through alcoves, which will provide shelter if the team is stranded far from base, or there is no base yet.
  - A lightweight sil-nylon tarp, with lightweight fluorescent safety cord (e.g., Kelty Trip-Tease) and stakes, could be combined with locally-improvised poles, to provide an improvised shelter for use as a medical clinic.
- Team gear should be easily divided up among members and attached to their backpacks, or perhaps hand-carried in a litter, for air insertions when the team must carry all their equipment.

- Additional Strike Team and member personal equipment requires baggage overage and should be expected, both for commercial air transport and for non commercial fixed- or rotor-wing aircraft transport.
- For certain situations, it may be appropriate to outfit teams with N-95 filter masks and military-style goggles.
- Should probably expect Strike Teams to resupply from a DMAT hospital every 1-2 days.
- Wound Care:
    - Need lots more wound care equipment, enough to do 10 major lacerations and 5 incisions and drainages (I & D) of abscesses.
    - 10 staplers
    - 10 staple removers (to give to patients), as they may need to take out staples themselves, or may present to medical professionals without staple removers.
    - 4 laceration trays for more complex lacerations
    - 15 sterile fields
    - sutures: box of 3-0 Ethilon, of 4-0 Ethilon and of 4-0 Vicryl.
    - case of Dermabond, 3M NexCare wound closure drops, or Indermil
    - case of 3M NexCare wound spray
    - anesthetics: lidocaine: two each of 1% and 2% with and without epi, and Marcaine with and without epi.
    - 10 each #10, #15 and #11 scalpels
    - 10 small 3-instrument trays
    - 100 4x4s (some single, some tubs)
    - three bottles of packing gauze for abscesses
    - 30 3" Kling for bandaging
    - 10 rolls of tape (assorted)
    - Hundreds of assorted Bandaids, including large ones.
    - 10 3" Ace wraps
    - Need ortho supplies:
        - 2 SamSplints
        - fiberglass splints: rolls of Ortho-Glass (brand necessary): 2", 3", 5" rolls, with extra closure clips for rolls.
        - Aircasts (brand necessary) 3 each, R and L.
        - Clean, dry socks to give out for under aircasts.
    - All surgical instruments must be stainless so can be reused with field Cidex or similar disinfection (had problems with nickel-plated instruments corroded)

        - Cidex, cleaning brushes and folding container for overnight resterilization.
    - Documentation
        - Make up landscape orientation form for listing patient name, other information, and any treatment or counseling done to capture some information when no time for full patient reports. Could use for immunizations or med distribution.
        - Would like to have stickers on IV/IM medications like Rocephin, as like those used on tetanus vaccine prefille syringes (dT), for record-keeping. We could contact manufacturers and request this, as their contribution to disaster preparation.
        - Aluminum clipboards with form storage for writing (often no desk or table available).
    - Non-medical community needs:
        - For some first-in Strike Teams, food, water and sanitation are as critical as medical needs.
        - During the early post-disaster phase, Strike Teams should travel with standard loads of:
            - MREs
            - bottled water
            - hand cleaner
            - soap
            - chlorine bleach
            - lime and entrenching tools for slit latrines
            - toilet paper
            - handwashing posters, and
            - paper towels.
        - Logistics could design a standard pack for such use, which could be added to the Basic Load or distributed directly to Strike Teams. All Strike Team members should receive training in how to teach the local populace how to make slit trenches.

Personal Gear

Observation:

- For the same size and weight of pack, those with lightweight hiking/climbing equipment could carry much more gear, and be much more effective and safe.

Recommendations:

- Waterproof pocket notebooks should be provided by NDMS for all team members (available from www.sarcamp.com).

- Team members should bring personal stethoscopes, but, especially in view of possible air insertion, consider BP cuffs team gear to be provided by FEMA.
- Clothing and Packs:
    - More so than for DMAT hospital personnel, Strike Team members should use lightweight backpacking/climbing gear, both for quality of gear and meeting weight limits. We should arrange "pro deals" with the equipment manufacturers. Mountain Rescue Association team members do this routinely and get this expensive outdoor gear at a fraction of the retail price. The PA-1 DMAT will investigate these Pro deals for DMAT teams and will share the information with other DMATs.
    - Wicking/warm-when-wet/fast-drying team T-shirts should be encouraged. Also, for uniformity of uniforms, we recommend that T-shirts be required to have a standard size and typeface of lettering on the back, in a color contrasting to the T-shirt color (e.g., DMAT in 3" letters, PA-1 in 4.5" letters, Arial Black) with whatever design the team desires on the front. Team members found that the local populace reacted positively to seeing T-shirts representing teams from all across the country—better than a simple military-type uniform.
- Personal equipment should to be prepacked for possible air insertion:
    - Gear for air insertion in a climbing/backpacking type softpack (in the 3500-4000 cubic inch range, such as the Gregory Acadia pack, www.gregory.com).
    - Other material should be in a rolling duffel with backpack straps to leave at base if air inserted, such as the High Sierra (www.highsierrasport.com) AT202 36" Drop-Bottom Wheeled Duffel with Backpack Straps (available from www.cabelas.com).
    - Personal/team gear should be packaged for protection from the elements (e.g., plastic trash bags as liners inside sleeping bag stuffsacks.
- Personal Food: recommend that Strike Team members bring:
    - dried fruit, nuts, granola to supplement MREs (and counteract their constipating effects).
    - Gatorade or similar mix, at least during summer months.
    - Freeze-dried meals (lighter than MREs if need to do air insertion, and team should be able to purify its own water after most insertions)
- Camelbaks: When being deployed into a hot environment, the military are issued Camelbak backpack hydration systems; NDMS should consider stockpiling them and issuing them to teams in such environments, as they have been shown to improve an individual's effectiveness by making adequate hydration easier.
- Miscellaneous Personal Equipment:
    - PackTowls (brand name) or equivalents that dry quickly are highly recommended (available from many outdoor suppliers including www.rei.com) are far superior for our use than cotton towels; also small pieces usable as washcloths.

  - Team members may want to pack two toilet kits: one "regular" and one austere; the austere one can be taken when being inserted by air.
  - Especially if air-inserted, every fluid or powder in toilet kits, or for that matter anywhere in the pack, should be put into Nalgene bottles. These laboratory-grade plastic bottles are lightweight, virtually leakproof and indestructible, and available in sizes as small as 1 ounce. They are available from many suppliers including www.rei.com.
  - Headlamps: strongly recommend all Strike Team members carry and use a lightweight LED headlamp such as the Petzl Tikka Plus (www.karstsports.com) or Princeton Tec EOS 1W Luxeon side-emitting LED (www.karstsports.com) or similar, as well as spare AAA cells (AAA lithium disposable recommended, available from WalMart; or AAA alkalines)
  - Lightweight strong reflective cord for multiple purposes including clothesline: "Trip-Tease" cord by Kelty which meets these needs is available from a variety of suppliers including www.rei.com.

- "First Aid Kit"
  - It is recommended that team members bring a "first aid kit." But for those with medical training, what should be in a first aid kit?
  - The Wilderness EMS Institute *Personal Wilderness Medical Kit* (Appendix C) provides a good personal medical kit for team members.
  - In the next two months, a website (www.disastermedical.org) will provide an independent forum for developing such ideas further, inviting input from domain experts in both wilderness and disaster medicine and EMS.
- Sleeping gear: for Strike Teams who may need to shelter outside a DMAT, members should carry:
  - a lightweight sleeping bag (e.g., the Western Mountaineering Ultralite bag, available from www.westernmountaineering.com).
  - a lightweight sleeping pad (e.g., the Therm-a-Rest ProLite 4 Sleeping Pad – Regular, available from www.rei.com, and
- Color Code Tape:
  - Many climbers and mountain/cave search and rescue team members use 3M ¾" vinyl tape, overlaying narrower strips onto a full width of contrasting tape, to color-code their equipment, using combinations of colors (e..g, green-blue-green, yellow-blue-yellow).
  - We should encourage this: it makes it much easier to sort out personal gear after a deployment. In wilderness search and rescue, individuals tend to use a single ¾" width of multicolor tape, and teams tend to use multiple pieces of ¾" tape; we could use the same model for DMATs.
  - DMAT teams could keep a master color-code roster on their team websites, in case some gear ends up with the wrong DMAT team after demobilization.
- Personal Electronic Equipment:

- Palm or similar PDA with multiple reference programs (e.g., ePocrates, mobile PDR), personal laptops, personal portable printers, personal amateur handheld radios, and the like should be encouraged ***with*** the proviso that NDMS can take no responsibility for replacement if lost or damaged.
- Nonetheless, many DMAT personnel (who are, in real life, volunteers) will likely bring such equipment, despite the financial risk, given how such equipment markedly increases their and their teams' effectiveness.

- Appendix B (One member's SAR/Disaster equipment list) offers additional ideas on personal equipment for DMAT team members.

Communications

Observations:

- Our team's communications, and those from the DMAT hospital to the MST, were very, very poor.
  - We were told to go to a particular point and contact the MST for additional instructions. However, once we reached the location specified, we were unable to contact the MST by landline (all out), cellphone (towers down), satellite phone (ours, unbeknownst to us, would receive but not transmit).
  - Our UHF FEMA handheld radios were ineffective when we tried to use them in a half-mile radius around the Waveland Fire Department.
  - For another example, the day after Dr. Conover arrived home in Pittsburgh, he received a cellphone call from the MST trying to reach someone (anyone) at the Hancock Medical Center DMAT Hospital.
  - When we had a medic out away from the Fire Station in a National Guard HumVee, even though within a half-mile, FEMA UHF radios failed to work. The National Guard all had FRS radios. We found that the FRS radios were effective, but only when the communicator at the Fire Department stood on top of a car for better elevation and better ground plane.

Recommendations:

- Especially for Strike Teams, our communications are our lifelines.
  - Our communications should be ***robust***: not susceptible to disruption by single point-source failures.
  - We therefore need a communications strategy that incorporates ***redundancy***: the belt-and-suspenders approach.
  - Strike teams should go into the field with two functioning and recently-tested communications modes. This can be sat-phone and cellphones, sat-phone and VHF communications using handhelds for nearby tasks (but see below), sat-phone and landline phones, or if all else fails and the capabilities are available, sat-phone and amateur radio devices (e.g., portable 80-meter radios). While security is a valid concern, FEMA has recently been chastised in the press for focusing too much on terrorist threats and security and not enough on providing emergency response. This is an example: if amateur radio can make our teams more effective and safer, even at the risk of some communications security, we should embrace it.

  - All communications equipment should, if possible, include backups of critical elements. For instance, each Strike Team should be issued not one but ***two*** handheld 12V chargers. Basically, if a piece of equipment is important to communications, each Strike Team should have not one but two of them. For instance, a team should ideally have two sat-phones, so if one breaks, the other can be used. This is distinct from having two communications ***modes***: if a satellite goes out, having two sat-phones is no good, so a second communications mode is needed to avoid this possible point-source failure.

- For Strike Team safety, it is imperative to set up a tower and high-gain antenna at Base to improve comms to Strike Teams. (These antennas are available as part of the Basic Load.) This should be a priority early in BOO setup. As a general principle, one should not send out Strike Teams until they have robust and redundant reliable communications. Base should send out scout team out to test both modes (e.g., satphone, UHF using tower at BOO.)
- Every handheld radio should have a 12V charger/power supply to use in-vehicle without depleting batteries, and every radio should have an external window- or gutter-clip or magnetic-mount antenna to improve communications from inside vehicles. For amateur radios, these are available quite cheaply from suppliers such as www.aesham.com and in most cases, the amateur versions work well with compatible commercial equipment.
- Every radio should have an AA cell case, and teams should carry plenty of spare disposable AA cells (lithium disposables are lighter and recommended, though alkalines are acceptable).
- Every radio should have an extendable whip antenna to provide better ERP (effective radiated power) and better reception in marginal conditional. For amateur radios, these are available quite cheaply from suppliers such as www.aesham.com and in most cases, the amateur versions work well with compatible commercial equipment.
- Team members who are amateur radio operators ("hams") should be encouraged to bring personal 2M/UHF handheld radios, though cautioned that losses will not be recompensed. If all other means fail, these radios do provide effective simplex communications over a roughly 1-2-mile radius. This would be a last resort and should be only used in critical situations and no sensitive information should every be sent via amateur radio. Users could identify strictly by call letters and not mention FEMA or DMAT at all. This is suboptimal but, given our experiences in the field, is critical for life safety, which quite overrides potential security concerns.
- FRS radios sometimes used by DMAT team members, also used by National Guard and Army units in Iraq and in this disaster theatre, may be of some use, particularly in convoys or close locations. However, they are significantly inferior to amateur radio handhelds both in terms of effectiveness and security.

Travel

Navigation, GPS and Map Programs

Observations:

- GPS Units were provided by FEMA, but they did not have street level data in them, and prior to travel, the street-level data was not downloaded from CD to the GPS units.
- The GPS units had small screens; poor usability compared with laptop-sized screen.

- No physical maps of the theater were provided.
- The convoy from Anniston/Camp McClelland to Camp Shelby/Hattiesburg offered several opportunities for improvement:
    - The Convoy was told to stop in Meridian for fuel at an air base, and was given a phone number for directions (and told to call as we approached Meridian)—but when nearing Meridian, the man was not in, and his wife was unable to give adequate directions. The convoy made many wrong turns, and had to U-turn many times.
    - The best directions were given by a member in the caravan who had an "unapproved" laptop running Delorme Street Atlas USA 2005 Plus, with a Garmin GPS-18 USB GPS unit placed on the roof of the rental car—without these directions, the team thinks it likely that the convoy would have taken several more hours en route.
    - This would have been a significant safety risk as the convoy didn't arrive until ~0500 and many of the drivers were already sleep-deprived, having been up since 0300 the previous day. Due to problems with navigation, a reported 6-hour drive took 12 hours.
- One team was told to go to a specific town and an air base in that town, but given no directions and had to scrounge to get better directions.
- When our whole team was sent to Keesler AFB the directions were a photocopy of the state highway map (without street detail) and instructions to "take the interstate, and follow the signs, turn right when you get in the gate; look for Jones Hall." There were no signs to the AFB as we were forced to exit the interstate and found ourselves on a residential street. We had to use Street Atlas to even find Keesler AFB, and after finally finding a gate, and getting a base map, and finally finding Jones Hall, we still had to call the MST for directions as Jones Hall was locked and empty. Street Atlas on the personal laptop at least allowed us to find Keesler AFB and then Jones Hall, which would have taken hours otherwise.

Recommendation:

- Teams should always travel with state highway maps for area.
- The MST should obtain and distribute state highway maps and city street maps for the area.
- FEMA should stockpile Rand McNally Street Guide (physical and CD version) for all major cities, and arrange with Rand McNally for site licenses for all DMAT teams for all maps of all cities. Members should be encouraged to bring personal laptops (but informed that they will not be eligible for claims if damaged or lost) with Street Atlas USA and a magnetic-mount GPS such as the new Garmin GPS-18. Note: we did attempt using the FEMA-supplied GPS unit, and found the much-larger laptop screen ***far*** superior to the small GPS unit screens for navigation, even if we had been able to access the street-level detail on the supplied GPS unit.
- Strike teams should never be sent out without at least some sort of physical map of an area. This is a critical safety concern. Examples include driving around so much when lost that the vehicle runs out of gas in an unsafe area. Maps provide teams with the capability for planning an escape route, even if only "head north until you find I-10 and head east."
- Even if a year or two old, digital or print maps are close enough to be much better than no map at all. Stockpiles of digital and print maps should be kept and issued as needed.

- Laptops:
    - All FEMA laptops should be provided with map software and used in vehicle convoys.
    - based on team preferences, and experience with both last year's and this year's hurricane deployments) we recommend Delorme Street Atlas USA Plus over competing products, ($100 direct; www.delorme.com).
    - Laptops should be provided with a simple USB GPS unit such as the Garmin GPS-18 USB ($80 from www.amazon.com; details at www.garmin.com).
    - Laptops should be provided with a 12V power supply so they work in vehicles.
    - Laptops should be provided with at least and preferably two car-power cigarette-lighter splitters (1->2 adapters) to allow laptop and handheld radio charger to be operated at the same time (available from Radio Shack).
    - All FEMA vehicles should be supplied with Jotto Desk Universal Floor - Computer Mounts (http://www.jottodesk.com) on which to mount a laptop; when mounted just below the windshield, can be viewed at the same time as the roadway ahead: a "poor-man's heads-up display."
    - A detailed review of and guide to using Street Atlas for in-vehicle navigation provides additional background and practical suggestions.

Strike Team Vehicle Entourage

A Strike Team should always travel with at least two vehicles. The reasons are as follows:

- For safety, and in particular, robustness of travel, must be able to put all personnel in one vehicle to escape unsafe situations, even if this means abandoning one vehicle and most of the team's equipment. Example: vehicle gets stuck in sand dune deposited on highway after hurricane (actually happened) or more likely, get a flat tire.
- Strike Teams are supposed to be mobile, but the amount of equipment, particularly when adding additional supplies, requires at least two vehicles. Example: Strike Team going to Pearlington in the early post-hurricane period when food and water urgent needs, took MREs and bottled water.
- Although rare, and presents safety risks, may be situations where advisable to divide strike team in two for short time.
- Strongly consider four-wheel or all-wheel vehicles for Strike Teams given their mobility into areas with uncertain travel conditions.
- Strongly consider vehicles with roof racks (can carry extra gear such as MREs, bottled water, gas cans).
- Strike Teams will frequently be mobile without a fixed base and must keep all or most personal gear as well as team gear in vehicles.
- Vehicles should be topped-off with fuel if below ¾ tank or whenever convenient (such as when in a military reservation.) Refueling trips from base should be made with skeleton crew of driver and FPS protection as necessary.

Convoy Safety

Although convoy safety applies to many situations, Strike Teams travel quite a lot.

- It was generally thought advisable to remove all FEMA/NDMS/DMAT identification from Strike Team vehicles, due to concern about possible looting for narcotics.
- There is a balance between maintaining a safe following distance vs. not letting interlopers into the column. If there are reliable communications between all vehicles, the concern about interlopers separating the column is less and safety is much enhanced.
- Space vehicles at appropriate max distance and use two vertical white shoe polish lines on the windshield to mark the maximum visual size of the vehicle ahead to assure safe inter-vehicle spacing and stopping distance.
- Recommend FEMA analyze Army Field Manual on convoys, and publish own very brief convoy manual, available in handout form to hand to each vehicle when convoying.
- It seems very important to avoid being "minute-wise but hour-foolish." It almost always is appropriate to take extra time to plan the convoy route and ensure assure that any vehicles separated from the column will have both communications and independent ability to navigate to the goal. For instance, on our marathon drive to Camp Shelby, MA-1 DMAT leaders, who were coordinating the convoy, took the time to get what directions they had to all vehicles in the convoy. We also would have done better if we had delayed an hour or two to download street-level detail to all our GPS units. If one vehicle had not had a GPS/laptop combination with street-level detail for the area, it is likely the convoy would have taken hours longer—and given the sleep-deprived state of some of the drivers, this could have ended with multiple deaths.
- We have observed DMAT convoys going too fast (frightening) and going too slow (frustrating). Five or ten miles below the speed limit, for clear conditions, seems near optimum for the type of convoys we are using. Larger convoys will move more slowly, smaller ones faster. Having confident navigation (see section on GPS and Navigation) allows speedier convoys.
- For large convoys, sending faster-moving scouting teams ahead may smooth the convoy's path—although this should be done only if the scouts will be safe and have robust communications (see section on Communications).

Security

Observations/Recommendations:

- We felt very secure while having Federal Protective Service (FPS) officers with us. Based on our observations, having FPS officers is ***much*** better than military guards without MP training.
- Given the variation in experience, capability and training of FPS officers, they ***must*** be encouraged and enabled to tell team if they have ***any*** concerns about safety, and communicate them ***immediately*** with team leadership.
- FPS ***must***, with no reluctance, provide security whenever asked, and not decline to assist team members when asked.
- Suggested by FPS: all team members should have a supply of Cyalume or similar bioluminescent light sticks, to be used in dark shelters so, if shooting breaks out, the FPS will not shoot team members. Cyalume necklaces are available which should provide

visibility 360° and may be superior for this use. (Available from many suppliers, such as www.extremeglow.com; approximately $25 retail for a package of 50.)

Appendix A: Recommended Strike Team Pharmacy

Observations:

- Carrying a stock of commonly used medications for primary care and emergency medical management proved essential to the mission.
    - Initially the DMAT pharmacy permitted us only to record medication needs identified on our "rounds", return to the base to turn in written prescriptions, and then return to a site to distribute meds.
    - The return visit often was the following day, which did not meet the needs of a moving population – some had to be transported to the hospital during the night, some residents/refugees changed shelters, some had relatives take them in elsewhere, and others who walked or drove to the shelter from their homes to obtain meds could not return the next day for their meds (for a variety of reasons).
- Once the team, with the assistance of the pharmacists, started carrying a stock supply of medications for emergency and primary care needs, we became much more effective in our interventions and truly provided needed service to the communities.

Recommendations:

- To organize and transport medications as above in an austere environment, a sizable case with drawers, dividers, and locks that can be transported in a backpack-like fashion would be well-suited to the task. (Our make-shift pharmacy of plastic bags housed in empty MRE boxes was difficult to keep organized as well as protected from the elements).
- Laminated charts of the contents, drug category, and therapeutic equivalents should accompany the pharmacy pack(s).
- This backpack-pharmacy will need to include means of delivering meds (cups, water, pedipods, small bags and Sharpie markers).
- Below you will note our recommendations for specific medications that would serve many of the needs of a Strike Team in the field, based on our experiences. Those with an asterisk may be found/used for more than one purpose/category.
    - Antibiotics (note: would rather have PO and IV/IM all together, can decide on PO/IM/IV after considering patient's problem and available antibiotics remaining, may run low on stock and have to make compromises)
        - trimethoprim/sulfamethoxazole BACTRIM* PO pills and powder for suspension
        - ceftriaxone ROCEPHIN IV/IM
        - ciprofloxacin CIPRO* PO
        - doxycycline PO
        - acyclovir ZOVIRAX PO
        - azithromycin ZITHROMAX (PO/IV)
        - cephalexin Keflex PO
        - ampicillin IV
        - amoxicillin PO
        - gentamicin IV/IM
        - metronidazole FLAGYL* PO/IV
        - ampicillin/sulbactam UNASYN
        - cefuroxime CEFTIN, ZINACEF
        - fluconazole

        - cefdinir (OMNICEF) powder for suspension,
        - amoxicillin/clavulanate AUGMENTIN PO pills and powder for suspension
        - mupirocin BACTROBAN topical
        - bacitracin topical
        - antifungal topical (spray likely best given wet conditions but heavier)
    - Vaccines:
        - Tetanus (adult and a few peds)
        - Hep A
        - Hep B
        - access at base to pediatric immunizations and rabies, and during the fall will need access to Influenza A/B.
    - HEENT:
        - Fluorescein strips
        - tetracaine,
        - erythromycin ophthalmic ointment single tube packs
        - EPISTAT or similar nasal tampon
        - AURALGAN or similar otic analgesic drops
        - cyclopentolate CYCLOGYL drops for corneal abrasions
        - oxymetazoline AFRIN spray
        - budesonide RHINOCORT nasal spray
        - eye drops for glaucoma (need to consult ophthalmologist for recommendations)
    - Analgesics/Anesthetics: (some of these are already in yellow bag in Thomas pack)
        - phenazopyridine PYRIDIUM*
        - lidocaine XYLOCAINE (1% and 2% with and without epinephrine)
        - bupivacaine MARCAINE, SENSORICAINE with and without epinephrine)
        - ketamine
        - atropine
        - midazolam VERSED
        - etomidate
        - vecuronium
        - acetaminophen/paracetamol TYLENOL
        - ibuprofen MOTRIN*
        - Toradol IV
        - no IV narcotics except for morphine (already in Thomas pack)
        - Sting-Eeze liquid
        - pramoxine/calamine CALADRYL lotion
        - access at base to fentanyl DURAGESIC patches
    - Steroids:
        - prednisone* PO
        - triamcinolone cream
        - dexamethasone DECADRON* IV/IM
    - Pulm/Asthma/Allergy:
        - MDI
            - albuterol (packed inside of spacers)
            - ipratropium ATROVENT
            - budesonide PULMICORT
            - Advair

        - Singulair 5 & 10mg
        - Alavert dissolvable tabs,
        - hydroxyzine ATARAX* PO
        - amitriptyline* or better nortriptyline 25 mg PO for pain adjunct
        - solumedrol* IV
        - epinephrine SQ*
        - diphenhydramine BENADRYL* PO and IV
    - Cardiovascular (choose cheap, daily, stable meds in these categories)
        - HTN
            - Diuretics
                - hydrochlorothiazide
                - furosemide LASIX PO
                - KCl for co-therapy
            - clonidine
            - ACE and ARB
            - clonidine CATAPRESS patches* also with alcohol swabs for applying to dirty skin, also for withdrawing heroin addicts
            - calcium channel blockers
            - clonidine PO
            - labetalol PO and IV/IM
            - atenolol PO
        - digoxin
        - anti-anginal –
        - Plavix, coumadin, nitro paste and spray, baby ASA, ? access at base to Lovenox/Alteplase/Integralin
    - Endocrine:
        - levothyroxine SYNTHROID
        - insulin
            - Regular
            - Novolin 70/30
            - Lantus
        - access at base to IV-DDAVP
    - Neuro/Anti-Seizure:
        - phenytoin DILANTIN PO
        - fosphenytoin IM
        - phenobarbital PO
        - gabapentin NEURONTIN*
        - valproic acid DEPAKENE
        - carbamazepine TEGRETOL
        - lorazepam ATIVAN/diazepam VALIUM* (Thomas pack),
        - prochlorperazine COMPAZINE (for migraines)
    - Psych:
        - lithium PO
        - escitalopram LEXAPRO PO
        - benztropine COGENTIN PO/IM
        - haloperidol HALDOL PO/IM
        - midazolam VERSED IM
        - hydroxyzine ATARAX PO
    - GI:
        - loperamide IMODIUM PO

        - antacid tabliets
        - PPI such as lansoprazole PREVACID PO/IM,
        - famotidine PEPCID PO
        - sucralfate CARAFATE PO
        - ciprofloxacin CIPRO* PO
        - Miralax/lactulose
        - Senna-S
        - metaclopramide REGLAN (Thomas pack)
        - MAALOX and diphenydramine BENADRYL liquids* (for mouth ulcers)
        - silver nitrate sticks for cauterizing mouth ulcers (Thomas pack?)
    - GU:
        - tamsulosin FLOMAX PO
        - phenazopyridine PYRIDIUM* PO
        - trimethoprim/sulfamethoxazole BACTRIM* PO
        - ciprofloxacin CIPRO* PO
        - fluconazole DIFLUCAN PO
        - metronidazole FLAGYL* PO
    - Dental:
        - clindamycin CLEOCIN PO, IM, IV
        - bupivacaine MARCAINE with epinephrine for dental blocks
    - Musculoskeletal/Rheum:
        - allopurinol*
        - meloxicam MOBIC*
    - Burns:
        - silver sulfadizene Silvadene
        - access at base to treatment for radiation burns
    - Misc/Other:
        - Thiamine (treat starvation)
        - caffeine
        - nicotine patch
        - polyvalent pit viper anti-venom at base

Appendix B: Sample Personal Search and Rescue/Disaster Equipment List.

(see separate listing: Appendix_B.pdf)

Appendix C: Wilderness EMS Institute Personal Wilderness Medical Kit listing.

(see separate listing: Appendix_C.pdf)

Search and Rescue Gear
Keith Conover, M.D., FACEP

C:\text\asrcmisc\Personal SAR Gear\SAR Gear.doc
Version 1.4 8/27/05

Winter-only items in cold blue, summer-only items in hot orange

I. Miscellaneous Gear Bag[i]

- ☐ **White shoe polish** for marking windshields for convoys; in Aloksak plastic bag
- ☐ **Toilet Kit:**
  - ☐ PackTowls: 1 large, 2 small
  - ☐ Contacts solution, contacts case, razor, Q-tips
  - ☐ Washcloth
  - ☐ Travel Bath large towelettes (1 pkg of 8)
  - ☐ Toothbrush and paste, floss, flossers, Stimudents
  - ☐ Pocket tissues
  - ☐ Tampax[ii]
  - ☐ Comb
- ☐ **Light:**
  - ☐ Eveready fluorescent D-cell lantern with lithium cells
- ☐ **Water:**
  - ☐ 3 1-liter bottles
  - ☐ MSR water bag if not on pack
  - ☐ Backpacking water filter (superseded by MiOx unit)
  - ☐ Extra canisters for backpacking water filter
  - ☐ Empty 2.5 gal water bag and bladder
- ☐ **Shelter:**
  - ☐ Disposable compressed sleeping bag
  - ☐ Roll of leaf bags
  - ☐ Wad of smaller trash bags
- ☐ **Clothing:**
  - ☐ Old Goretex parka/pants
  - ☐ Spare nylon pants
  - ☐ Bag with spare gear:
    - ☐ 2 wool balaclavas
    - ☐ pair wool mittens
    - ☐ 2 pair brown fleece gloves
    - ☐ pair wool socks and liner socks
    - ☐ leather gloves
    - ☐ cheap compass and 2 whistles
    - ☐ spare goggles
- ☐ **Food (in mouse-resistant boxes):**
  - ☐ MRE/Fireline Meals: 4
  - ☐ MRE heaters: 3
  - ☐ Can of dried greens: 1
  - ☐ Granola bars: 1 box
  - ☐ Bacon bits: 1 small can
  - ☐ Survival (cream of wheat) bars: 1 package
  - ☐ Quick-cook dried veggie meals: 3
  - ☐ Lexan lunchbox: 1
- ☐ **Stove accessories:**
  - ☐ Windscreen
  - ☐ Base
  - ☐ Extra fuel canisters (1 small, 1 large)
  - ☐ Large Pots, potscrubber and detergent
  - ☐ Cups and plates and utensils (2 each)
- ☐ **Tools etc:**
  - ☐ Spare set of Aloksak zipper plastic bags
  - ☐ Folding saw
  - ☐ Survival knife
  - ☐ Magnifiers
  - ☐ Solar Still
  - ☐ Daypack
  - ☐ Frisbee
  - ☐ Cards
  - ☐ Organic vapor respirator

II. SAR pack[iii]

- ☐ **Belt pouches/hipbelt stuff (often in net bag for easy transfer between packs)::**
  - ☐ **Left hipbelt pocket (LowePro camera pouch)**
    - ☐ Waterproof notebook and pen
    - ☐ 2 granola bars
    - ☐ spare AAA cells (3) for headlamp
  - ☐ **Right hipbelt pocket (LowePro camera pouch)**
    - ☐ Compass/whistle
    - ☐ Petzl Zipka Plus headlamp
    - ☐ wrist and head sweatbands
    - ☐ contacts saline
    - ☐ earbud speaker-mike for Yaesu handheld radio
    - ☐ small roll duct tape
    - ☐ counting beads:
      - ☐ 5 light 1 dark, 5 light 1 dark
      - ☐ 10 light on longer string
  - ☐ **Cellphone pouch**
  - ☐ **Folding toilet trowel/toilet paper**
  - ☐ **Otter Armor waterproof/crushproof PDA case**
  - ☐ **Pelican 1010 Micro Case (Tungsten T3 just fits inside it)[iv]**
  - ☐ **MSR MiOx water purification device**
- ☐ **Top Compartment Stuff:**
  - ☐ 1-Liter Nalgene Water Bottle with duct tape wrapped around it
  - ☐ 4-person European-style Pertex Bivouac Sac (Bothy 4 by Terra Nova Equipment)
  - ☐ Pack Raincover
  - ☐ Sunglasses
  - ☐ Small Aloksak plastic bag for wallet, etc.
  - ☐ Large Aloksak plastic bag for use as waterproof map case
  - ☐ A few fast-food salt packets (for salting drinks in summer)
- ☐ **Survival/Junk Bags 1 and 2 (2 for extended trips; NB always have certain items already on person)[v]**
  - ☐ Outdoor Research Mesh Cube #4 (outer case)
  - ☐ MSR 700 mL titanium pot with handles
  - ☐ Lexan spoon
  - ☐ disposable AA lithium cells, 16, in hard plastic case from Porter's Camera Store

- ☐ plumber's candle melted into 2-oz(?) cylindrical fliptop plastic container
- ☐ water purification tablets and neutralizing tablets (sealed, backup only)
- ☐ 2.5 gallon military-style canteen-liner water bag, in pint freezer Ziploc bag for protection
- ☐ Set of Aloksak tough/light zipper plastic bags
- ☐ 3 leaf bags
- ☐ red cotton bandanna (with leaf bags in protective Ziploc bag)
- ☐ wrist sweatband (with leaf bags)
- ☐ 4 small packets toilet paper, in tiny thin zip plastic bags (in with leaf bags)
- ☐ pack of tiny playing cards
- ☐ Sears ignition pliers
- ☐ 3" strip of kneadable epoxy putty
- ☐ one tube of cyanoacrylate gel glue (sealed in plastic bag)
- ☐ waterproof notebook, 2 pens and 2 pencils and tiny pencil sharpener
- ☐ one heavy-duty Omniseal plastic bag sized for wallet
- ☐ waterproof/windproof matches + striker card in waterproof matchcase
- ☐ magnesium firestarter
- ☐ 2: 50' lengths of Kelty reflective tentcord
- ☐ 2: 5-yard rolls duct tape (from rei.com)
- ☐ cable ties: 2-3", 4-6", 4-9"
- ☐ 5: misc. sized needles, in old case for spare mechanical-pencil erasers.
- ☐ tiny bottle contacts solution
- ☐ eyeglass repair kit with screwdriver and spare screws
- ☐ tiny stuff, in film can: small bits of thread, 5 assorted-size safety pins, 2 paper clips, 4 small pieces of Radio Shack easy-melt solder, one 8-32x1" bolt with nut and two lockwashers, spare bulbs for Duo headlamp,
- ☐ 2 packets of Gatorade mix, each to make 1 liter
- ☐ Tiny survival compass
- ☐ Fiskars pocket knife sharpener
- ☐ Photonlight II[vi] (2) in film canister
- ☐ Jakstrap headband for Photonlight (2)
- ☐ Ditty bag with spare salt and 4 spare D123 batteries (for MSR MiOx water purification device)

☐ **Medical:** WEMSI Personal Wilderness Medical Kit (3 red "First Aid" bags; see official WEMSI kit listing)

☐ **SAR Stuff bag**
- ☐ Lightweight goggles (for air operations; clear/tinted interchangeable lenses)
- ☐ Swim Goggles
- ☐ Lightweight hearing protection (earplugs on lanyard)
- ☐ 2" webbing for backpack carry or load strap
- ☐ 1 roll flagging tape
- ☐ Waterproof handheld radio case
- ☐ 3 Surgical masks and small bottle eugenol (oil of cloves) for masking smell of decomposed bodies
- ☐ Spare AA cell pack for Yaesu FT-50 radio
- ☐ 2 Orion pocket flares (exp 5/06)
- ☐ 2 Orion 60-second smoke signals (exp 2/07)
- ☐ Plastic signal mirror

☐ **Water:**
- ☐ 5 gallon water bag with shower attachment and spare sacks (2) and line/minibiner for hanging
- ☐ 2-Liter Camelbak (summer or winter version, depending on season) (on outside of pack)
- ☐ 1-Liter Nalgene bottle (in top section)

☐ **No-cook food, in 1.9L Lock and Lock box:**
- ☐ 8 Boomi Bars[vii]
- ☐ 2 2-oz. Packs of Stoned Wheat Thins
- ☐ 2 4-oz. Packs of Stoned Wheat Thins
- ☐ 2 4.5 oz cans of mackerel fillets in olive oil
- ☐ Lexan fork

☐ **Warmth:** Thinsulate vest in lightweight dry bag

☐ **Shelter:**
- ☐ Mont-Bell Blizzard Pack compressed disposable sleeping bag
- ☐ Adventure Medical Kits' Thermo-Lite® bivouac sack[viii]

☐ **GoreTex Pants**

☐ **Light:** Spare Princeton Tec 4-AA cell halogen light with improvised diffuser and set of spare batteries and spare bulb and Jakstrap headband; also spare batteries for ActionLight LED headlight

☐ **Radio Chest Harness**[ix] with spare long-duckie dual-band antenna for handheld radio

☐ **Vertical gear bag**
- ☐ Petzl seat harness
- ☐ Titanium BMS micro-rack
- ☐ Petzl Frog ascending system with extra quick-attach ascender

☐ **Minimum technical gear sling in bag**
- ☐ Gear Sling (single-length sewn runner)
- ☐ Gloves
- ☐ Single-length sewn runners
- ☐ Double-length sewn runners
- ☐ Prusik loops
- ☐ Locking D rings
- ☐ Non-locking carabiners
- ☐ Small rescue pulley
- ☐ 20' 1" webbing (for improvised seat harness)
- ☐ Emergency one-hand-opening knife with keeper cord

☐ **On outside of pack:**
- ☐ ThermaRest ProLite 3 Short inflatable pad in stuffsack
- ☐ GoreTex Parka (with balaclava and gloves in pockets)
- ☐ Fluorescent mesh Mountain Rescue safety vest
- ☐ Backpacking Static Emergency Rope: 80' of 5.5mm Blue Water Titan Spectra Cord (20 kN strength but no energy absorption) tied in a rescue coil
- ☐ 2-Liter Camelbak (summer or winter version, depending on season)

III. SAR Gear Bag

- ☐ **Top Section**
  - ☐ Color code tape
  - ☐ Short gaiters
  - ☐ Long gaiters
  - ☐ 60 mL Nalgene bottle of SPF 45 sunblock
  - ☐ 60 mL Nalgene bottle of DEET insect repellent
  - ☐ White shoe polish for marking on convoy vehicle windows
- ☐ **Side Pocket:** aluminum clipboard with storage full of SAR forms, pens
- ☐ **Boots etc.:**
  - ☐ Limmer custom backpacking boots with boot socks/liners
  - ☐ Crampons for above
  - ☐ Stabilicers strap-on ice "creepers" for glare ice after ice storms[x]
  - ☐ Yaktrax Pro ice creepers Sorel winter backpacking boots with pac liners and two extra pair of liners and large mesh bag for hanging liners on pack to dry
  - ☐ Spare crampon wrenches
- ☐ **Ski Goggles** (in one of the Sorel boots)
- ☐ **Winter hood** with rebreathe flap
- ☐ **Winter insulated facemask**
- ☐ **2 Rolls flagging tape**
- ☐ **JetBoil stove**
- ☐ **Food for Heating/Cooking, in 1.9L Lock and Lock box:**[xi]
  - ☐ 4 oz. Quinoa (fast-cooking complete-protein grain)
  - ☐ 4 oz. Cous-cous (tiny pasta; just pour in boiling water)
  - ☐ 2 pkgs. Hot cocoa mix
  - ☐ 4 pkgs. Boullion mix
  - ☐ 1 oz. Freeze-dried cooked diced beef
  - ☐ 1 Mountain House entrée
  - ☐ Lighter for stove
  - ☐ 2 Lexan spoons
- ☐ **Clothing**
  - ☐ Polartec Fleece Top and Bottoms (Crestone Alpine Designs)
  - ☐ 2 pair dry/clean boot socks/liners
  - ☐ Pants Bag:
    - ☐ 2 pr CoolMax underpants (briefs)
    - ☐ 1 pr polypro long underwear
    - ☐ 1 pr artificial-fabric "jogging pants" (LL Bean climbing pants)
    - ☐ 1 pr Ex-Officio fleece-lined nylon pants
    - ☐ 1 pr Patagonia shelled Capilene overpants
  - ☐ Shirt Bag:
    - ☐ 1 cotton long-sleeved ASRC uniform shirt
    - ☐ 1 cotton ASRC T-shirt
    - ☐ 1 Sequel net CoolMax desert shirt
    - ☐ 1 zipper-turtleneck mid-weight wicking top
    - ☐ 2 Lightweight CoolMax fishnet T-shirts
  - ☐ Food (3 days' worth if combined with what's in SAR pack)
    - ☐ 2.6L Lock and Lock[xii] box with 3 freeze-dried Mountain House or Natural High dinners ("Serves 2"—yeah, if you're not hungry)
    - ☐ 2.6L Lock and Lock box with
      - ☐ 6 1-liter packets of Gatorade mix
      - ☐ 2 4-oz. packets of walnuts, sealed (with commercial food bags sealed with a commercial heat-sealer, with oxygen-excluder packets in each)
      - ☐ 6 oz. Stoned Wheat Thins sealed in bag
      - ☐ 1 lb (6 blocks) of Mainstay compressed emergency food rations[xiii]
- ☐ Bug suit (mosquito netting)

IV. Technical Rescue Bag

- ☐ **Rope:** 50 meter dynamic climbing rope)
- ☐ **Technical Gear:** about 50 lbs of misc. climbing and technical rescue gear including three deadmen (can use in mud, e.g., in caves)
- ☐ **Winter:** three snow pickets, crampons and crampon wrenches in crampon case

V. Items Loose in back of truck

- ☐ **Charcoal Vest** HeatPac hypothermia rewarming device with 18 hours of fuel in Pelican box
- ☐ **Mini-Opskit** (in a file box)
- ☐ **Helmet with 2 lights** (HDS Systems ActionLight III on order to replace old ActionLight I; Princeton Tec 4-AA cell halogen flashlight with improvised diffuser mounted to helmet with mounting-style cable ties)
- ☐ **Hanging Clothes/etc.:**
  - ☐ Tilley hat
  - ☐ Best GoreTex Parka (Marmot Glenmore) with hat, facemask and gloves
  - ☐ Powerstretch fleece pullover (LL Bean)
  - ☐ Thick fleece jacket (Lowe)
  - ☐ Fleece stretch tights (Lowe)
  - ☐ Softshell jacket (Cloudveil Serendipity) with Cloudveil hat, facemask and winter gloves
  - ☐ Primaloft vest (Cloudveil Enclosure)
  - ☐ Expedition down parka and pants and mittens (for standing around for long periods in cold weather)
  - ☐ ASRC Uniform Shirts:
    - ☐ Short-sleeve cotton shirt
    - ☐ Long-sleeve cotton shirt
    - ☐ Long-sleeve CoolMax shirt
    - ☐ Long-Sleeve lightweight polyester fleece/chamois shirt
  - ☐ **Large Mountainsmith lumbar pack** ("Cairn"[xiv]) with two full 750 mL water bottles, spare LED headlamp, spare flagging tape, Water bottle/water bottle belt pouch (contents for quick access while driving; pack for short warm-weather tasks with Everyday Emergency Kit from everyday pack instead of most of SAR gear)
  - ☐ **DMAT uniform**
    - ☐ team t-shirt
    - ☐ uniform jacket-shirt
    - ☐ uniform pants/belt
    - ☐ team hat
    - ☐ buttpack with
      - ☐ big hearing protectors
      - ☐ big goggles
      - ☐ gloves with minibiner
    - ☐ below hanging clothes: combat-type boots with zip-up inserts (summer Danner Striker GoreTex boots or winter Matterhorn ATD insulated boots, depending) with two pair Rohner brown trekking wool socks
- ☐ **Sleeping bag stuffsack**
  - ☐ Sleeping bag (3-season or winter: Western Mountainnering down bags)
  - ☐ Polypro liner
  - ☐ Silk liner
  - ☐ ThermaRest Stuffable pillow
  - ☐ Extra stuffsack with:
    - ☐ Down booties
    - ☐ Overboots for staggering around in deep snow in down booties
- ☐ **ThermaRest ProLite 4 Regular inflatable pad in stuffsack with repair kit**
- ☐ **MSR Hubba one-person tent and Hennessy Backpacker Asym Ultralight hammock with winter insulation kit**[xv]
- ☐ **Army blanket**
- ☐ **Tracking stick (old bamboo XC ski pole without basket but with rubber bands)**
- ☐ **Flotation vest and polypro throw rope in bag**
- ☐ **Box with 4 FRS radios and batteries**
- ☐ **Spare VHF/UHF ham handheld radio (Yaesu FT-50)**
- ☐ Ice Axe
- ☐ Life-Link™ break-apart snow shovel
- ☐ Ski Poles
- ☐ MSR Snowshoes
- ☐ Old down parka (stuffed)
- ☐ **Vehicle Equipment**[xvi]
  - ☐ Cellphone handsfree kit
  - ☐ Jottodesk with GPS (connected to external antenna mounted on roof), 12V power supply for laptop
  - ☐ VHF/UHF/ham mobile radio
  - ☐ Misc maps (including spare highway maps to give away)
  - ☐ Spare versabrite II headlights mounted on sun visors
  - ☐ Glove compartment:
    - ☐ Princeton Tec 4-AA cell LED flashlight with Jakstrap headband
    - ☐ Leatherman tool and large and small multi-screwdriver
    - ☐ Sunglasses and spare sunglasses
    - ☐ Red shop rag for cleaning windows
    - ☐ Reflective Mountain Rescue safety vest and two pair of exam gloves
    - ☐ Glass signal mirror
    - ☐ 2 GoJo hand cleaner towels, individual packets
  - ☐ Behind seats in pockets
    - ☐ Vehicle maintenance records; ham repeater atlases/maps; reference manuals for stereo, VHF radio, etc.,
    - ☐ Toys for kids to entertain themselves with so they don't destroy the car
    - ☐ Common atlases of the area
    - ☐ Windex
    - ☐ Large umbrella
    - ☐ Inflatable Travel Pillow (for naps along the road)
    - ☐ Sun visor for laptop
    - ☐ Extra Teaching Company CDs (for those long drives—best way to stay awake yet: www.teachco.com)
  - ☐ Attached to back of back seats[xvii]
    - ☐ Large truck-style cross lug wrench[xviii]
    - ☐ Snow brush/scraper
    - ☐ squeegee/window scrubber
    - ☐ Life-Link snow shovel

- ☐ Spare high-gain 2m/VHF antenna (have antenna mount on roof, used mostly only when vehicle stationary)
- ☐ Canvas grocery bags and Nalgene bottles for bringing home olives in brine, smoothies, etc.
- ☐ Large Medical Pack (REI travel pack; not currently indexed, but full of lots of medical stuff, believe me)
- ☐ Attached to inside of tailgate: Hi-Lift 48" jack with attachments and instructions
- ☐ Set of hand extrication tools, etc.
  - ☐ leaf spring tool (handmade, for cutting)
  - ☐ hand sledge hammer
  - ☐ hatchet
  - ☐ 2 titanium pry bars
  - ☐ bolt cutters
  - ☐ mini-KT-bar (extrication/wrecking tool)
  - ☐ 1970s-era Air Force aluminum survival tool with hatchet, shovel, saw
  - ☐ 12-V tire pump
- ☐ Set of trail construction/xmaintenance tools on heavy leather tool belt/tool pouches
  - ☐ Woodsman's Pal machete/brush hook
  - ☐ Pocket folding loppers (Lee Valley Garden Supply)
  - ☐ Buck lightweight pruning shears(www.sarcamp.com)
  - ☐ Folding SvenSaw
  - ☐ Single-bitted axe in aluminum sheath (Madsen Logging Supply)
  - ☐ Glock entrenching tool
  - ☐ Optional (only added when actually going out for trail maintenance):
    - ☐ Stihl Chainsaw
    - ☐ Ryobi Weedwhacker
    - ☐ Gas and oil for above
    - ☐ 10-lb sledge
    - ☐ Grass whips (2)
    - ☐ Non-folding loppers
    - ☐ Large shovel with cutting edge
- ☐ Large vehicle Tool Kit
  - ☐ Electronics Tools
    - ☐ Soldering Irons: 12V, 110V, butane (with lighter-style butane refill tank)
    - ☐ Small solder (including low-melting-point solder strips, work with lighter)
    - ☐ Misc RF adapters (BNC, PL-259, TNC, SMA)
    - ☐ BNC coax patch cables with BNC M/M
    - ☐ Pocket multimeter with spare batteries
    - ☐ Wire crimper/stripper
  - ☐ Electrical Equipment
    - ☐ Continuity tester
    - ☐ AC extension cord
    - ☐ Pocket AC circuit tester
    - ☐ Roll of electrical tape
    - ☐ car fuses (many kinds and ratings) and fuse puller
    - ☐ Light socket to AC adapter
    - ☐ Radio Shack Leatherman tool (with wire stripper, etc.)
    - ☐ Nippers
  - ☐ Hand Tools
    - ☐ Large and small Vise-grips
    - ☐ Sears Craftsman ignition pliers (small)
    - ☐ Alltrade needlenose/standard pliers combination
    - ☐ Heavy-duty scissors
  - ☐ Wrenches (all Sears Craftsman except as noted)
    - ☐ Large and small crescent wrenches
    - ☐ Adjustable box-end wrench
    - ☐ Metric and SAE-Imperial hex key sets, folding
    - ☐ Metric wrenches in rolled case:
      - ☐ combination wrench set: 8mm-16mm
      - ☐ box-end wrench set: 6mm-18mm
      - ☐ ignition wrench set: 4mm-11mm
    - ☐ SAE-Imperial wrenches in rolled case:
      - ☐ combination wrench set: 3/8"-11/16"
      - ☐ ignition wrench set: 13/64"-3/8"
    - ☐ Socket/hex tools (sockets on Crafstman racks):
      - ☐ AmPro stubby ¼"-3/8" ratchet handle
      - ☐ Skewdriver® offset hex handle
      - ☐ generic hex screwdriver-style ratchet driver with set of bits in handle
      - ☐ 6" long hex Phillips screwdriver tip (for deeply-inset screws)
      - ☐ ¼" ratchet handle
      - ☐ ¼" screwdriver-style handle driver
      - ☐ ¼" 3" extension
      - ☐ ¼" 3" flexible extension
      - ☐ ¼"/hex finger-wheel driver
      - ☐ ¼" metric sockets, 5-6-7-8-9mm
      - ☐ ¼" SAE-Imperial deep socket set, ¼"-1/2"
      - ☐ 3/8" standard ratchet handle
      - ☐ 3/8" 2.5" and 6" extensions
      - ☐ 3/8" to ¼" reversible adapter
      - ☐ 3/8" to ¼" adapter
      - ☐ 3/8" metric deep socket set, 10-19mm
      - ☐ 3/8" metric/SAE-Imperial combination socket set: 3/8"-10mm to 7/8"-22mm, also 12,18 & 24mm
      - ☐ ½" drive flex long handle
      - ☐ ½" drive 24 mm socket
      - ☐ ½" drive spark plug socket
      - ☐ ½" to ¼" adapters, both
    - ☐ Small reversible Philips/standard screwdriver
    - ☐ Craftsman small long screwdrivers, standard and Philips
    - ☐ Offset standard and Phillips screwdrivers
    - ☐ Set of 4 small Phillips screwdrivers
    - ☐ Jeweler's screwdriver and nutdriver sets
    - ☐ Stubby Philips and standard screwdrivers
  - ☐ Mini-hacksaw and extra blades
  - ☐ Type 13 Anti-Seize lubricant in tube
  - ☐ Mini-pry bars (2)
  - ☐ Spare batteries: 9V (2: lithium), AA (8: lithium), AAA (6), C (4) D (2)
  - ☐ Spare mag-mount 2m/VHF antenna
  - ☐ Large and small cleaning brushes, and battery-terminal brush
  - ☐ spare roll of color code tape
  - ☐ duct tape
  - ☐ Card stock and sheet protectors and Sharpie marker for posting signs
  - ☐ Aluminum coathanger
  - ☐ Thin steel wire

- ☐ Plastic kitchen trash bag
- ☐ Nuts, bolts, screws, nails, cable tires, spare wire, rubber bands, electrical terminals, small Bunji cords, thumbtacks, packets of epoxy glue,
- ☐ Red shop towels
- ☐ GoJo hand cleaner towels, individual packets
- ☐ Heavy work gloves

☐ Winch Tool Kit
☐ 2 Aluminum adjustable jack stands (3 ton)
☐ 2 folding tire chocks
☐ Jump cable bag (Duluth Trading Co. Deluxe Jumper Cable Bag)
- ☐ Heavy-duty jump cables
- ☐ Work gloves (Bucket Boss)
- ☐ Gunk pressurized can of tire sealer/inflator
- ☐ Disposable coveralls
- ☐ tire repair can (inflation/sealer)
- ☐ folding cross lug wrenches, Imperial and Metric (for other cars)

☐ Fire extinguisher
☐ Spare tire on back
☐ Bag of straps for roof rack
☐ Bundle of road flares
☐ Box of triage tags
☐ Needle disposal box
☐ Bag of reflective Mountain Rescue safety vests
☐ Mag-mount rotating light with yellow/blue/red lenses[xix]
☐ Jar of cat litter (for traction)
☐ Copper ice scrapers (2)

V. Caving Gear

☐ **Misc: Caving Gear**
- ☐ Boots and socks
- ☐ Polypro tops and bottoms
- ☐ Helmet with HDS Systems Actionlight and Princeton Tec lights
- ☐ Caveralls with:
  - ☐ gloves
  - ☐ waterproof paper, pen, pencil
  - ☐ small contacts saline (2)
  - ☐ Malden Powerstretch 100 union suit, underpants and CoolMax fishnet and socks
- ☐ Caving necklace (quick-release) with
  - ☐ tip cleaner brush
  - ☐ small folding knife/screwdriver
  - ☐ whistle
  - ☐ small compass
  - ☐ 2 Photon microlights

☐ **Cave Pack Contents**
- ☐ 500 cc water bottle with duct tape
- ☐ extra food: 4 power bars and some jerky/in bottle
- ☐ thin balaclavas/in bottle
- ☐ thin pile sweater/in dry bag
- ☐ 8 lithium AA cells and iodine water tablets/in bottle
- ☐ hypothermia kit/in bottle:
  - ☐ 3 leaf bags
  - ☐ candle/in bottle
  - ☐ matches/in waterproof case
  - ☐ Mg metal firestarter
- ☐ junk incl. 2 Photon microlights/in bottle
- ☐ minimum vertical kit (seat, biner, 2-knot rig)
- ☐ first aid kit
  - ☐ SamSplint
  - ☐ standard daypack first aid kit
- ☐ Swiss Army Knife and mini Leatherman/on lanyard
- ☐ 30' parachute cord

VI. Disaster pack items in red must be added to gear on deployment

- ☐ Add From truck:
  - ☐ Clothing:
    - ☐ appropriate hanging clothes for area
    - ☐ Khaki Tilley Hat
    - ☐ Hanging DMAT uniform on hanger (shirt, pants, T-shirt-, DMAT hat, belt pouch with hearing protection, gloves, DMAT Pharmacy cache quick reference)
    - ☐ black boots below DMAT uniform
  - ☐ SAR gear (from pack and from SAR Gear Bag):
    - ☐ Belt pouches/hipbelt stuff (includes altimeter; often in net bag for easy transfer between packs)
    - ☐ Survival/Junk Bags (2)
    - ☐ SAR Stuff bag
    - ☐ WEMSI Personal Medical Kits (three red bags)
    - ☐ Helmet with lights
    - ☐ Boots (also Sorel winter boots and liners for winter)
    - ☐ Spare VHF/UHF radio
    - ☐ Box of FRS radios (4) and batteries
    - ☐ Small tent (orange stuffsack) and Hennessy hammock *to pack*
    - ☐ sleeping bag and liner and stuffable pillow (in stuffsack; in winter, also include auxiliary stuffsack with down booties) *to pack*
    - ☐ hanging clothes: DMAT uniform, parka, and climate-appropriate additional clothing
    - ☐ helmet with light *to pack*
    - ☐ Otter Armor waterproof//crushproof PDA case
    - ☐ ***Magmount WiFi Antenna***
- ☐ Add from office/office closet:
  - ☐ Travel Documents
  - ☐ Laptop media base and floppy drive/housing
  - ☐ ***4-in-1 card adapter***
  - ☐ Three clear plastic "For Disaster Response" cases in closet and spare extension cord/PowerStripSaver/AC cheater plug (to rolling duffel) and directional WiFi antenna (improvised from 8" kitchen strainer; to ready pack)
    - ☐ Add to "Chargers" box from office near Color LaserJet:
      - ☐ Drop-in charger for handheld radio,
      - ☐ AC power cord for above
      - ☐ spare battery for above
      - ☐ *12V power cord for above*
    - ☐ Drop-in charger and AC power cord for Blue Logger GPS with spare battery
  - ☐ Add from bedroom closet, from travel bag:
    - ☐ Toilet kit
    - ☐ Brown bathrobe
    - ☐ Portable clock/radio/noise machine and AC adapter
    - ☐ Teva sandals
  - ☐ Add from bedroom:
    - ☐ Everyday shoes (Summer: Teva Sandals, Winter: hightop walking shoes)
    - ☐ Spare underwear and socks and T-shirts, packed in Eagle Creek packing modules and labeled
  - ☐ Add from moonlighting bag (into DMAT buttpack:
    - ☐ Medical headlight
    - ☐ Loupes ("surgical telescopes")
    - ☐ Name/license number stamp
    - ☐ otoscope/ophthalmoscope and otoscope bag
    - ☐ Broselow pediatric resuscitation measuring tape, laminated pocket cards
    - ☐ tools (bandage scissors, ViseGrips, Alligator Forceps, McGill forceps.)
    - ☐ NOT stethoscope (have lightweight one in Physician Addendum to WEMSI Personal Wilderness MedKit)
- ☐ **Main Gear Bag: rolling duffel from basement across from freezer: High Sierra (highsierrasport.com) AT202 36" Drop-Bottom Wheeled Duffel with Backpack Straps (purchased from Cabela's, www.cabelas.com)**
  - ☐ White shoe polish for marking "DMAT" etc. on car windshields; in Aloksak plastic bag
  - ☐ Radio Shack Leatherman electronics tool (with wire stripper)
  - ☐ Nalgene bottle with dry laundry detergent
  - ☐ 1 bath size PackTowl, in net bag
  - ☐ pack lock and multi-luggage cable lock
  - ☐ Aluminum clipboard with forms storage and DMAT Medical Record and other forms
  - ☐ backup GoreTex jacket
  - ☐ 3 days' food, packed in two Lock and Lock airtight containers (add additional Lock and Lock boxes from SAR Gear Bag)
  - ☐ Nalgene bottle (60 mL) with extra sunscreen
  - ☐ Nalgene bottle (60 mL) with extra insect repellent
  - ☐ Multi-fuel stove, fuel bottles, gas siphon
  - ☐ cup/plate/knife/fork/spoon
  - ☐ lightweight duffel for pulling stuff out of pack to fit in overhead compartment
  - ☐ spare uniform items (prepacked, including black/navy CoolMax fishnets to wear under uniform t-shirts)
  - ☐ Clothing: appropriate hanging clothes for area, Khaki Tilley Hat
  - ☐ Hanging DMAT uniform and black boots below it
  - ☐ Laptop media base and floppy drive/housing
  - ☐ Three clear plastic "For Disaster Response" cases in closet and spare extension cord/PowerStripSaver/AC cheater plug
    - ☐ Computer Box:
      - ☐ Laptop Mouse and cord
      - ☐ AC cord, cheater, 3-way adapter, two Powerstrip Savers
      - ☐ Modem cord and female-female adapter (2 each)
      - ☐ CD-Rs in thin cases (5) and 3.5" floppies (3)
      - ☐ USB-serial port adapter
    - ☐ Charger Box Add to clear plastic boxes from office near Color LaserJet
      - ☐ Drop-in charger for handheld radio,
        - ☐ AC power cord for above
        - ☐ spare battery for above
        - ☐ *12V power cord for above*
      - ☐ Drop-in charger and AC power cord for Blue Logger GPS with spare battery (if not in pack as is likely)

- ☐ StarTAC cellphone desk charger with 12V and AC adapters
- ☐ Laptop/GPS Travel kit:
  - ☐ 12V PowerPole power cord with battery clamps
  - ☐ 2:1 PowerPole-connector 12V cord
  - ☐ PowerPole 12V extension cord
  - ☐ PowerPole-female cigarette adapter cord
  - ☐ 2:1 cigarette-lighter adapter
  - ☐ Laptop AC/DC Power Supply with AC and DC cords, also cords for Palm and Cellphone and tip for USB
- ☐ Camera and camera bag and camera battery charger (once get new camera)

☐ Add from bedroom closet, from travel bag:
- ☐ Toilet kit
- ☐ Brown bathrobe
- ☐ Portable clock/radio/noise machine and AC adapter
- ☐ Teva Sandals
- ☐ Shoe driers

☐ Add from bedroom:
- ☐ Everyday shoes (Summer: Teva Sandals, Winter: hightop walking shoes)
- ☐ Spare underwear and socks and T-shirts, packed in Eagle Creek packing modules and labeled

☐ Add from truck:
- ☐ Laptop sunscreen
- ☐ Boots (also Sorel winter boots and liners for winter)
- ☐ Spare VHF/UHF radio
- ☐ Box of FRS radios and batteries
- ☐ Small tent (orange stuffsack) and/or Hennessy hammock and hiking sticks for poles *to pack*
- ☐ sleeping bag and liner and stuffable pillow (in stuffsack; in winter, also include auxiliary stuffsack with down booties) *to pack*
- ☐ SAR gear (from pack and from SAR Gear Bag):
  - ☐ Survival/Junk Bags (2)
  - ☐ SAR Stuff bag
  - ☐ WEMSI Personal Medical Kits (three red bags)
- ☐ Add from Misc Gear bag: small toilet kit
- ☐ hanging clothes: DMAT uniform, parka, and climate-appropriate additional clothing
- ☐ helmet with light *to pack*

☐ Add from moonlighting bag:
- ☐ headlight
- ☐ loupes ("surgical telescopes")
- ☐ otoscope/ophthalmoscope and otoscope bag
- ☐ Broselow pediatric resuscitation measuring tape, laminated pocket cards
- ☐ tools (bandage scissors, ViseGrips, Alligator Forceps, McGill forceps.)
- ☐ NOT stethoscope (have lightweight one in Physician Addendum to WEMSI Personal Wilderness MedKit)

☐ SAR Pack (dump contents and refill with)
- ☐ Thermarest: use around inside of main compartment as padding, stuffsack, and repair kit
- ☐ SAR stuff (from pack and from SAR Gear Bag):
  - ☐ *Swim Goggles*
  - ☐ Survival/Junk Bags (2)
  - ☐ WEMSI Personal Medical Kits (three red "First Aid" bags: see separate list)
  - ☐ Helmet with lights
  - ☐ 2.5 gallon water bag with shower attachment and spare sacks (2) and line/minibiner for hanging

☐ Travel waist pack:
- ☐ Small (500 mL) water bottle: **(fill with bottled water)**
- ☐ ThermaRest pillow with eyeshades and earplugs
- ☐ bandannas (2), minibiners (2), elastic straps for head to keep head from flopping around when sleeping sitting up in the back of a C-130
- ☐ food: **add several food bars and some nuts**
- ☐ book
- ☐ toilet paper in Ziploc bags
- ☐ Toothpaste and toothbrush
- ☐ Waterproof notebook and pen
- ☐ Palm Ultralight Keyboard

☐ 24-hour "ready" pack:
use Tumi pack, add to it/leave in it:
- ☐ **(move EEK buttpack to outside to make more room for stuff inside)**
- ☐ Top Compartment:
  - ☐ Thin Balaclava and thin gloves
  - ☐ Umbrella
  - ☐ Glasses case with
    - ☐ Glasses
    - ☐ contacts case
    - ☐ Contacts Solution
    - ☐ Glasses keeper cord
  - ☐ Grey pouch with
    - ☐ Personal meds: Pulmicort and albuterol inhalers, Rhinocort nasal spray, Pepcid, Imodium, Compazine, Kleenex; one food bar; small roll of color code tape
  - ☐ Ear buds for Palm/wave machine
  - ☐ Tiny AM/FM earphone-type radio
  - ☐ Lightweight 6' tape measure
  - ☐ Belt pouch with
    - ☐ Blue Logger Bluetooth GPS
    - ☐ Spare battery for Bluetooth GPS
    - ☐ 12V power cord for Blue Logger
    - ☐ PC Card Bluetooth Adapter
- ☐ Side compartment: pouch with
  - ☐ Mercy Hospital ID and clip for FEMA/DMAT IDs (IDs in wallet)
  - ☐ Toothbrush and toothpaste
  - ☐ Grey pouch with
    - ☐ Belkin USB AC power adapter
    - ☐ Belkin USB cigarette lighter power adapter
    - ☐ ZipLinq USB Palm power cord
    - ☐ ZipLinq USB cable/Motorola StarTAC cellphone power adapter
    - ☐ ZipLinq Modem cable and connector
    - ☐ ZipLinq RJ-45 cable
    - ☐ USB LED light for laptop keyboard
    - ☐ 2 reflective armbands
    - ☐ Small cloth and tiny (5mL) bottle Windex (for cleaning glasses, camera, laptop)
    - ☐ Spare StarTAC cellphone battery

- ☐ Side Compartment: with
  - ☐ Handheld VHF/UHF Radio
  - ☐ extra antenna
  - ☐ extra AA cell battery pack and AA cells (4 lithiums)
- ☐ Small back lower compartment with pens, combs, small (5 mL) contacts solution bottles, waistbelt and sternum strap for pack
- ☐ Large back lower compartment with:
  - ☐ Nail file
  - ☐ Highlighter
  - ☐ Sharpie
  - ☐ Checkbook
  - ☐ Extra business cards
- ☐ Main Compartment
  - ☐ Light GoreTex parka
  - ☐ Light GoreTex pants
  - ☐ Powerstretch Vest
  - ☐ Everyday Emergency Kit/buttpack (see separate listing)
  - ☐ Parallel-USB print cable for laptop
  - ☐ Small Mesh bag travel overnight kit 1: 30mL Nalgene bottle of shampoo, CoolMax underpants, light Coomax fishnet T-shirt, pr. wool socks. (Already have toothbrush, toothpaste, contacts solution and combs in other pockets of pack.)
  - ☐ **Small Mesh bag travel overnight kit 2: track shorts, CoolMax tank top, 3 TravelBath towels (sealed in plastic bag) 1 small PackTowl. (add from rolling duffel)**
  - ☐ Laptop
  - ☐ Laptop AC/DC power supply
  - ☐ **Laptop sunscreen from car**
  - ☐ **Spare extension cord and PowerStripSaver and AC cheater plug from closet**
- ☐ File pocket on back with
  - ☐ clear document wallets (4)
  - ☐ **travel documents**

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[i] Miscellaneous Bag, SAR Gear Bag, Caving Gear Bag, and Technical Rescue Bag are Patagonia boot/duffel bags, circa 1990, which I don't see in the catalog any more. Uniform size and shape makes packing the back of the truck easier. Each is labeled with a 3x5" laminated tag with the name of the bag on the front, and my name/color code/contact information and a brief contents on the back, attached via a 2" split-ring put through a brass grommet on the tag and then around a strap; similar tags on the SAR pack, tool kit, etc.

[ii] No, no, not for me—to sell to desperate women. Sometimes worth their weight in gold—well, they don't weight very much, do they?

[iii] My theory is to keep pretty much everything packed in the SAR pack and then take stuff out of it when heading out—this way I'm less likely to forget something important. I also won't put liquids in my gear unless they are (1) in a Nalgene container, or (2) inside an Aloksak heavy-duty zipper plastic bag. I also color-code everything. I used to think that this was an affectation by some SAR people I know, but from 35 years of SAR experience, I now tend to color code more than I used to. However, I still don't beat Gene Harrison—Bru Randall once went to a costume party wearing a large cardboard box, painted white, with big, wide green-red-green stripes running down it. Everyone immediately knew he was dressed as Gene's refrigerator.

[iv] Not sure which is better, I'm playing around with both. The Pelican case is half the size and weight of the Otter. But the Otter has the following that the Pelican doesn't: (1) a soft-plastic insert on the front through which you can write on the PDA screen, (2) a Motorola-style belt clip on the back, and (3) a wide elastic band on the back under which you can slip your hand when using the PDA—makes it more secure when you're holding it.

[v] Swisschamp Swiss Army knife with crosscut saw, file, etc.; windproof Windmill lighter; two Photonlights; small lockback knife.

[vi] Photonlights packed with Vaseline for water-resistance; or, the newer, water-resistant ones.

[vii] The best fruit-and-nut bars I've found; available from www.amazon.com

[viii] From www.adventuremedicalkits.com. I used to carry a Space™ Sportsman's Blanket (heavier than the emergency blanket, and has grommets on the corners), folded in half with sticky Velcro stapled along two edges. This could be un-Velroed and used as a tarp, or used as is as a quick bivouac shelter. However, this weighs almost a pound, and the Thermo-Lite sack weighs about half as much. There are no grommets on the corners but it wouldn't be hard to tie some shroud line onto the corners, tying around a pebble if needed for strength. The Space Sportsmen's Blanket will fold out flat, and the Thermo-Lite sack is sewed on the bottom and partly up one of the sides—but a pair of Swiss Army Knife scissors could make quick work of this. When I put Velcro on my Space Sportsmen's Blanket, I put it all the way around on the bottom and side, and left the top open. The Thermo-Lite sack is sewn on the bottom and part=way up the side, and has Velcro up the rest of the side and, unlike my prior home-brew, across the top. But the Velcro is intermittent, with ~6" Velcro strips alternating with open areas. I'm not convinced my homebrew was superior, so I'm going to try the Thermo-Lite as is. One criticism of the Thermo-Lite Bivouac sack (at www.backpackergeartest.org –great place for gear reviews) is that the small mesh vent at the bottom keeps closing when you make random movement, as there is both hook and pile Velcro on either side of it. I put a small piece of non-sticky pile Velcro in the stuffsack with the bivouac sack which should take care of this.

[ix] Currently I favor one from The Pouch.

[x] Not sure which I like best, planning to try both after next ice storm.

[xi] This size available as part of a set from www.amazon.com

[xii] Available at Target stores; cheap, sturdy enough to be crush resistant (though not so much as an Otter or Pelican box, only a fraction of the weight and bulk), waterproof and airtight.

[xiii] Take a block, crumble into a cup. Add about a cup and a half of hot water. Stir. Wait for a few minutes. Makes Cream of Wheat with cream (not nonfat); excellent hot breakfast.

[xiv] The Cairn model is big enough to fit both the Everyday Emergency Kit small buttpack (which is almost always with me) and a laptop computer along with a few other things. Handy for carrying at a base somewhere—especially when you don't want to leave your laptop laying about. Yes, you could use a daypack, but a lumbar pack is a lot easier to manage when you're taking it off and putting it on over and over. Also, the lumbar pack with the Everyday Emergency Kit and a couple of other items from the

SAR pack makes a dandy pack for a short SAR task in warm weather.

[xv] If you browse any of the Internet information on backpacking hammocks, you'll see that these hammocks, though expensive, are the darling of ultralight backpackers. Once you figure it out, you can set it up in under 3 minutes, as long as you have two somethings (trees, telephone poles, road signs, etc.) on which to tie the ends of the cords. Having a couple of tie-outs to either side is also very helpful. You can put it in places where there is neither room nor any flat place without rocks to pitch even a 1-person tent. An open cell pad to insulate underneath can replace your ThermaRest pad. Although it can be pitched as a tent, the open cell pad won't work as insulation this way, and you need a couple of stakes and something to use as a pole. A quick and handy shelter wherein to sleep for a few hours for when you're in a hurry.

[xvi] Vehicle is a 1988 Range Rover, a bit beat up, with an ARB bar and 9000-lb Warn winch on the front, extra offroad lights on the ARB bar, two batteries with an isolator, an external spare tire carrier, Thule bike rack on the back and Thule roof rack with bike racks and a canoe/Stokes litter rack attached to it.

[xvii] Attached using standard hardware-store spring clamps, attached with self-drilling screws.

[xviii] Range Rovers have large tires and require a truck-sized lug wrench.

[xix] For different jurisdictions, as needed; like yellow the best, especially for stopping along the roadside, as people don't get as excited and don't do as many stupid things as when they see a red or blue light.

Personal Wilderness Medical Kit

Version 2.0 August 5, 2001

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This Revision

Some of the major highlights of the changes are as follows. These are explained in more detail in the endnotes:

- A saline lock and saline flush have been added to the Advanced Kit, to allow WEMTs at the scene to start an IV, to give multiple medications, and to have a patent IV ready for when IV bags and tubing arrive.
- IM ketorolac (e.g., *Toradol*®) has been taken off the list, as it has virtually no advantages over oral ibuprofen (see endnotes).
- Tubex™ injections and syringes have been taken off the list, as the containers leak when overheated.
- A one-way valve has been added to the advanced kit, to provide some WEMT protection during mouth-to-endotracheal-tube ventilation.
- A small skin stapler has been added, for scalp wounds and for minor lacerations.
- Droperidol has been added as a multi-purpose replacement for both prochlorperazine (e.g., *Compazine*®) and haloperidol (e.g., *Haldol*®) for sedation, nausea, and migraines.
- After due consideration, we have added midazolam (e.g., *Versed*®*)* to the Advanced Kit, for sedation for procedures and for control of seizures, and removed ciprofloxacin (e.g., *Cipro*®), bisacodyl (e.g., *Dulcolax*®), bismuth subsalicylate (e.g., *Pepto-Bismol*®) and cyclobenziprine (e.g., *Flexeril*®).

Choosing a Wilderness Medical Kit: The Basics

Choosing the contents of a wilderness medical or first aid kit is hard. But if you are putting together such a kit, you may look to this document for help.

The Wilderness EMS Institute staff and contributors put a lot of effort into this document. One of our missions is wilderness medical education, so we are making the list public, but also showing how we decided on the list. The list might not be exactly what you need for ***your*** medical kit. But we hope you find this document, with all of its principles and explanatory notes, a good starting place for designing your own kit. If designing a large team kit, you may want to look at the WEMSI Team Medical Kit document, available at http://www.wemsi.org.

As we said, assembling a medical kit is hard. But there are many ways to make it easier. You can simply get a list from someone authoritative and assemble a kit based on that. But it may make more sense for you to ask certain basic questions, and then assemble a kit based on the answers.

Some obvious questions, but ones worth asking out loud at the beginning, are:

- **Who** is going to use the kit, and what is his or her level of training? *For WEMSI, these are people trained in accordance with the WEMSI WEMT Curriculum, who also have EMT-basic or EMT-paramedic training or the equivalent, and who have authorization from a physician to carry and use the kit as part of a wilderness EMS agency/SAR team.*
- **Who** will the kit provide for -- how many? And are there any **special needs** (e.g., pregnant women, diabetics, small children, dogs, horses)? *For WEMSI, the kits will be used to provide initial care for the subjects of wilderness and backcountry search and rescue operations, including lost person searches and mountain and cave rescue operations. The kits will also provide care for members of field teams, including dogs and horses, when they are remote from standard medical care.*
- **How long** will the kit have to provide medical care for these people? *For WEMSI, the kit design is for the most common sort of mountain and cave search and rescue operations in North America – tasks usually lasting 4-12 hours, rarely lasting longer, perhaps up to a day or two without resupply.*
- **Where** will the people be going? For instance, there's no need for altitude-related medications if they're just in the Appalachian Mountains (where altitude illness is exceedingly rare), and no need for a snakebite kit if they're hill-walking in Ireland or Britain, where there are essentially no poisonous snakes. *For WEMSI, the answer is "in any wild or backcountry area or cave in North America, exclusive of the Arctic."*

- **How much** can they carry? If it's a river rafting trip, a fairly heavy kit is OK, but if it's for a long backpacking trip along the Appalachian Trail, where it's usually possible to get to a road and to a hospital within a day or so, a lighter kit is in order. *For WEMSI, the answer from the field is "if we gotta carry this around with us all the time, up and down mountains and through cave crawlways, it's gotta be small and light."*

Asking those questions is just the beginning. Next comes a delicate balancing act. For example: reconciling the team doctor (who wants you to carry everything including four bags of IV fluids at 2.2 lbs. a bag) and the team members (fanatically weight-conscious backbacker-type ones who cut the handles off their toothbrushes and the margins off their maps and who want a kit that weighs less than an ounce). Another example: we had considered adding an ampoule of 50% dextrose to the kit. But it is very heavy, and fragile, and in almost all cases, one can get some oral glucose or other food into any hypoglycemic patient in the wilderness. For that matter, instant glucose test strips weigh very little; however, they have to be kept in an airtight container that is fairly large, and have a short shelf life when exposed to heat (as in a pack or car in the summer). Since almost all wilderness patients need glucose or food calories, we did not include glucose test strips in the kit, either.

Here are a few principles to guide assembly of your medical kit, though competing ones that must be delicately assessed and balanced.

Durability

Wilderness medical kits must withstand crushing and drop shocks. The degree of protection depends on the environment. For standard mountain search and rescue, the padding of a soft case, that can be inserted in a waterproof bag, may be acceptable. For cave rescue, though, a waterproof and crushproof case such as those made by Pelican, or a surplus ammunition box, is much more appropriate. For kits that may be used in both settings, the kit can be in a soft nylon organizer case, inserted into a waterproof plastic or nylon bag (or even just a pack with a good raincover) for mountain rescue, and inserted into a Pelican case or ammo box for cave rescue.

Wilderness medical kits must also withstand temperature extremes – medications that require refrigeration or a controlled room temperature, or that are dangerous when frozen and rewarmed, are not acceptable. Information about drug stability under temperature extremes is difficult to find, but some references can be found at http://www.wemsi.org in the Pharmacology Lesson Plan.

Wilderness medical kits must also be usable despite occasional outdated medications – medications that are unsafe when outdated, such as tetracycline, are not acceptable. Medications that still have significant

potency after expiration are ideal for wilderness kits. (Most drugs are still good for a year or two after their expiration date, if not grossly abused or kept at extreme temperatures, but there are exceptions.)

Flexibility

Wilderness medical kits must have the equipment and medications to handle common and serious problems. But to save weight, equipment and medications should have multiple uses. Medical kits used by search and rescue team WEMTs should be usable for dogs and horses, as these animals are often part of the SAR effort. (That's why the WEMSI WEMT Curriculum also contains a section on veterinary emergencies.)

Ideally, a SAR medical kit should separate into smaller modules -- so as not to have to carry entire kit on every task, especially if it is a "bash" team trying to get into a patient as quickly as possible – also to be able to divide the kit among team members. See the *Organization* section below for WEMSI's solution for this.

Although a SAR medical kit may be used just in one area, it should be adequate for mutual aid requests to other regions. For example, a North American SAR WEMT kit should carry medications for high altitude illness. Even teams in the Appalachian Region of the Mountain Rescue Association, or the Eastern Region of the National Cave Rescue commission should carry these. These "out of region" medications could theoretically be left out except for out-of-region responses. On the other hand, they don't weigh much. And, a high-altitude out-of-region response might come during an in-region operation -- meaning that WEMTs can't go home to get the medications that they've left out. And suddenly going to altitude without taking *Diamox*® is definitely ***not*** a good idea.

Kit Capabilities

There are two main targets for the WEMSI Personal Wilderness Medical Kit.

The first target of the kit is the search subject or rescue victim. The WEMT should have enough equipment and drugs, within the context of a kit that weighs less than a pound or so and isn't very bulky, to provide stabilizing care for most severe wilderness injuries and illnesses. A team with a larger medical kit will usually arrive within a several hours, and with some items from a standard EMT kit (BP cuff and stethoscope, bandages and dressings, splints), and maybe some IV fluids, the WEMT can provide reasonably good care from most common wilderness injuries and illnesses.

The second target of the kit is the field team's members. WEMTs should have enough medication to start treatment for common problems in the field, then for members to get home, get an appointment with their family doctor, and

have the condition re-evaluated. Considering the realities of both SAR operations and getting appointments with office-based doctors, enough for 3 days of treatment seems reasonable.

Expense

Some SAR team members will have to purchase medications with their own money -- many SAR teams can't afford to issue expensive kits to their WEMTs. Team WEMTs with self-purchased medications generally use their kits for personal trips as well as for SAR operations.

Samples are often available through physician offices, or from manufacturers, which may help decrease the cost of members' kits.

Even if the team issues everything in the kits, few SAR teams have much money, so medications and equipment must not be too expensive.

Safety

Any wilderness medical kit should contain instructions on the safe use of its medications. It is quite possible that the WEMT becomes injured, and a team member with less training will need to use the kit. And, a reminder about uses and dosages is always appropriate for anything that isn't used on a regular basis.

There are (at least) two good approaches to this. First, the physician medical director, or prescribing physician, can provide detailed standing orders for the use of medications in certain situations, and a copy of these should be placed in the medical kit. Second, a list of medications, both those in the kit as well as common medications carried in wilderness traveler's kits, their common indications, contraindications, dosages, and any cautions, provides a useful reference. Several of these are available in wilderness first aid books, and WEMSI is drafting a "pocket wilderness pharmacology reference" with the WEMSI Wilderness EMT in mind. Standing orders should be provided by the WEMT's physician medical director.

Accountability and Security

Physicians should be reluctant to prescribe or issue medication to WEMTs unless the medications are managed in an acceptable way.

There are two ways for a physician to provide medications for medical kits. First is to ***prescribe*** the drugs for each individual WEMT, and expect the WEMT to use the kit for personal use while in the wilderness. The WEMT may then to use these personal medications for others when needed, under the various state "Good Samaritan Laws," and more importantly, under the

common-law principle that requires one to provide care up to one's capacity when aiding an individual in distress – lest one be guilty of gross or willful negligence.

However, a more professional arrangement is for the physician have a pharmacy, usually a hospital pharmacy, ***issue*** the drugs to each WEMT. Consult with the local Drug Enforcement Administration office, and with a hospital pharmacist experienced in dealing ambulance services.

Many medications in wilderness medical kits are available in inexpensive generics without a prescription – over-the-counter or "OTC." While it is possible to issue OTC medications to each WEMT, the extra cost may be unwarranted. If each WEMT is responsible for replacing OTC medications as they become outdated, it may also make sense to make each WEMT responsible for replacing prescription medications, too. If so, require WEMTs to inspect their kits on a regular basis, perhaps once every two months, and replace drugs or equipment that are outdated or damaged. Drugs and equipment used for patient care should be replaced immediately.

This document now provides a place to note the expiration date of medications, as well a checkbox to use during inspections. A Microsoft Word version of the tables that follow is downloadable from http://www.wemsi.org -- and then the expiration date can be filled in on one's computer, and a copy placed in the kit for inspections.

Especially for scheduled drugs ("narcotics") that are issued, it is important to document usage, and to document when drugs are "wasted" or destroyed. The local DEA office and a local hospital pharmacist can help set up procedures to meet federal and state requirements. In general, scheduled drugs must be kept secure. During wilderness travel, two small, lightweight travel locks, one each on external and internal nylon cases provides the dual locking that is usually required; although this is not much of a deterrent, keeping the kit in one's pack in the backcountry is probably better security than a heavy steel box in an urban ambulance. However, when a kit is ***not*** in the backcountry, it is imperative to keep it secured as well as possible.

Organization

The organization of any kit will be contentious whenever more than one person is involved. However, most people will agree that making the kit modular, so that a lighter subset can be carried in certain circumstances, or the kit can be divided among different people, is valuable. WEMSI has found it so for our kits, and has organized them as follows. (See Figure.)

The **Minimum Module** is to always be carried by Wilderness EMTs, even if on a rapid response for a rescue, or on a small, highly mobile scratch ("hasty") search team. The design of several commercial medical kit bags allows a pouch which can Velcro into a larger bag. The smaller pouch would be ideal

for the Minimum Module, and the larger bag for the Search Module. However, the Minimum Module along with the Advanced Module is big enough that many WEMTs carry two full-size nylon first aid bags, one with the Minimum and Advanced Modules, and another with the Search Module.

The **Advanced Module** is for those with ALS (Advanced Life Support) skills – the ability to start IVs and give IV or IM medications, and to perform digital intubation. The Advanced Module is an enhancement to the Minimum Module -- every WEMT with advanced training (EMT-Intermediate and above) and accreditation to perform advanced skills should carry this additional module whenever on a search and rescue operation.

The Search Module should be carried by WEMTs when going on a search, as opposed to rescue, task. The Search Module is carried for most search tasks, especially if the team is fairly large or will be in the field for an extended period. For some searches, both cave and above ground, it may be appropriate to "stage" a full kit, including the Search Module, at a central location, easily accessible to all search teams. For a large team that may split up, several WEMTs may each take a Minimum Module with only one WEMT carrying the full kit, including a Search Module.

Packaging

First aid kit bags from Atwater-Carey (1-800-359-1646; http://www.omnibus.com/atwatercarey/), Outdoor Research (http://www.orgear.com/medical/medical.htm), or similar providers work nicely for organizing the WEMSI Personal Wilderness Medical Kit. The Minimum and Advanced modules fit nicely in the Atwater-Carey Expedition kit bag, and the Search Module fits in another similar bag. These bags have the great advantage of keeping things better organized, important if you're using the bag all the time.

For above-ground rescue, just putting these bags in a plastic bag deep in one's pack should be adequate protection. For caving, you can put the entire contents into a Pelican case, ammunition box, or Tupperware box that can be sealed with duct tape.

For pills, it is ideal to have prescription medications in separate blister packaging from the hospital pharmacy, with an expiration date marked on each tablet's packaging. Some nonprescription medications are also available in blister packaging. Most but not all of the blister packs have expiration dates on them. You can use a laundry marker to put expiration dates on each individual pill's packaging if needed. For pills not available in blister packages, it’s easy enough to put some in a tiny zipper-lock plastic bag (often you can get a few free from your local hospital pharmacist). Print up a label on your computer with the name and strength of the pill, and the expiration date. Cut out the label, “laminate” it with some clear tape, and place in the zipper-lock bag with the pills to provide a good label.

Some drugs come only in ampules that are opened by snapping off the top. They have the advantage of being very compact and light, but the disadvantage that they are fragile and difficult to pack. Small vials with rubber plugs on the top, covered by flip-off lids, are probably superior -- however, many drugs are only available in snap-off ampules, so you need to develop packaging for this.

Many people have tried many different means of packaging. Most of these have been on small packages people find in their "junk" boxes and therefore can't generally be reproduced by others. What you need is something that is:

- cheap, or easy to make
- provides moderate protection against breakage (note that the outer packaging of one's medical kit should also provide some protection, so this inner packaging need not be "bombproof" or "caveproof")
- light
- not bulky

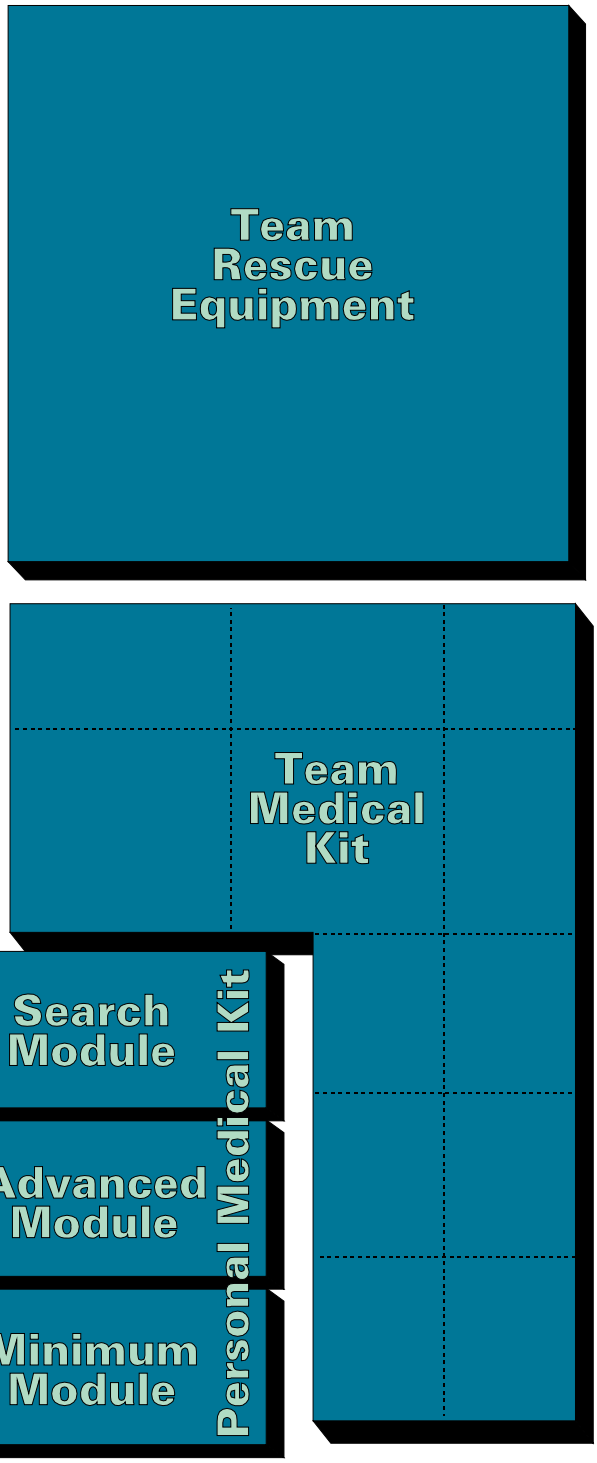
Some have made a package using the cardboard "rack" in which ampules are shipped in the box. This can be cut down to the right size for the number of ampules. One can then cut off a piece of stiff 3/8" closed-cell foam the same size as the "rack" and use duct tape to tape it on the front of the rack. Duct-tape the bottom, but leave the top open. You can then slide the ampules in from the top. They seem to stay in just fine without taping the top. You could tape some foam or an additional piece of stiff material to the back to provide additional protection, especially from flexing that might break the neck of the ampul. But that would add to the bulk and weight.

For storing medication vials and ampules, many are pleased with a tiny Plano™ fishing tackle box called a MiniMagnum 3213 (http://www.planomolding.com/tackle/3213.html, available inexpensively from many hardware and sports stores, and via the Internet from suppliers as http://www.wserv.com/oceanpro/inventory/tbox98.htm) This tiny box has small compartments the perfect size for two small medication vials, and with a tiny bit of padding in each small compartment, provides shock protection, as well as organization. With some modification (cutting) with a hot soldering iron or a tool such as a Dremel™ drill with a small cutting saw, the larger vials of ceftriaxone and water for dilution will fit into the larger compartments of this box.

Putting fluids such as StingEeeze™, povadone-iodine and tincture of benzoin into smaller bottles can save weight and bulk, provided they don't leak inside of the kit. StingEeze™ can be repackaged in a 4cc eyedropper bottle, available from suppliers such as from http://www.fisherscientific.com/ (Cat No. 0300710A) and povadone-iodine solution and benzoin can be repackaged into eight-cc Nalgene™ bottles, available from suppliers such as http://www.fisherscientific.com/, Cat No. 02-923-11A, NNI No.: 2002 9025.

Wilderness EMS Institute

Medical Kit System Overview



Notes:

1. See WEMSI Team Medical Kit and Personal Wilderness Medical Kit document text for details.
2. Minimum Module carried by all WEMSI medics at all times.
3. Advanced Module carried only by WEMSI medics with ALS accreditation, at all times.
4. Search Module carried by WEMSI medics when on a search or other operation (i.e., not a rescue) or as an option on some rescues.
5. A Personal Wilderness Medical Kit is to be included in the Team Medical Kit
6. Items such as litters considered part of Team Rescue Equipment rather than Team Medical Kit.
7. Team Medical Kit divided into modules so can be distributed among members of team; or, on some operations, only selected modules may be carried into field.

Minimum Module[1]

Prescription-only items are noted by ℞
Names are U.S. generic and tradenames.

✓	Exp[2] Date	#	Item and size/strength	Usual Dose
Pain Meds[3]				
		10	naproxen 220 mg tablets (e.g., *Aleve*®)[4,5]	Pain: ii PO, then i PO BID
		12	℞ acetaminophen with hydrocodone tablets (e.g., *Vicodin*®, *Lortabs*®, *Anexsia*®: 500 mg acetaminophen, 5 mg hydrocodone)[6,7]	Pain: ii PO Q4H PRN
Allergy Meds				
		1	℞ injectable epinephrine anaphylaxis kit (*Epi-Pen*®) (may omit if have advanced module with injectable epinephrine)	anaphylaxis: i injection
		1	℞ albuterol Rotocap™ inhaler[8]	asthma: i cap Q4H PRN
		8	℞ Rotocap™ albuterol capsules for above[9]	
		6	diphenhydramine 25 mg tablets (e.g., *Benadryl*®)[10]	allergy/sedation: i-ii PO Q4H PRN
		5	℞ Prednisone 50 mg tablets[11,12,13]	allergy/asthma: 50 mg PO QAM
GI Meds[14]				
		12	loperamide 2 mg. tablets (e.g., *Imodium-AD*®)	diarrhea: ii PO, then i PO q loose BM up to 7/day
		4	meclizine chewable 25 mg. tablets (e.g., *Bonine*®, *Antivert*®)[15,16]	motion sickness: i PO TID PRN
		4	℞ *TransDerm Scop*® transdermal scopolamine patches	motion sickness: i to skin Q3D
Bites and Stings [17]				
		1	Sawyer Extractor™ Kit	as directed
		1	*Sting-Eeze*® solution 15 cc bottle[18,19]	as directed
Cardiac Meds				
		4	Aspirin 325 mg (5 gr.) tablets[20,21]	chest pain: i PO
		1	℞ bottle nitroglycerine spray (e.g., *Nitrolingual*®)[22,23]	chest pain: i spray SL Q3' PRN

Antibiotics Etc.				
		6	℞ azithromycin 250 mg tablets (e.g., *Zithromax*®)[24,25,26]	infection: ii PO, then i PO daily
		1	℞ 3.5 g tube polymyxin/bacitracin (e.g., *Polysporin*®) or bacitracin ophthalmic ointment[27,28]	wounds: to skin BID
		1	mild liquid soap 30 cc bottle, e.g., *Hibiclens*®; or, a small piece of solid soap (to save weight) ; or, a small (e.g., 8 cc) bottle of waterless hand sanitizer [29,30]	
		1	Povadone-iodine solution 15 cc bottle (e.g., *Betadine*®)[31]	
Thermometer				
		1	digital thermometer (may substitute Radio Shack™ or similar continuous-reading digital thermometer)	
		1	spare battery for above	
		10	thermometer covers for above[32,33]	
Misc.				
		4	thiamine (vitamin B-1) 300 mg. tablets[34]	starvation, prior to refeeding: i PO
		4	℞ haloperidol 5 mg. tablets (e.g., Haldol®)[35]	sedation: i-iiii PO
		2	packets *Gatorade*® or *ERG*® powder, each to make ½ liter	
		4	pair exam gloves[36]	
		1	pocket CPR shield	
		1	1" (by at least 10 yards) waterproof adhesive tape[37]	
		1	8 cc bottle tincture of benzoin[38,39]	
		6	sterile cotton applicators ("*Q-tips*®")[40]	
		1	3" by 5 yds (stretched) elastic bandage (e.g., *Ace*®, *Coban*®, *Vet-Wrap*®)	
		1	3" by 5 yds (stretched) conforming roller gauze (e.g., *Kling*®)	
		8	medium-size (e.g., 3" x 3") gauze pads[41]	
		2	OB-type compressed vaginal tampons[42]	
		3	small pieces of clear adherent dressing (e.g., *Tegaderm*™, *OpSite*™)[43,44]	
		3	#11 scalpel blades, sterile	
		1	string for ring removal	
		1	paper clip, medium size[45]	
		2	large safety pins	
		1	nylon zipper bag or equivalent for MedKit	
		1	waterproof contents/protocols/standing orders[46]	
		5	one-pint freezer-style zip lock plastic bags (if not available elsewhere in SAR pack)	
		2	small (5-staple) skin staplers[47]	
		5	WEMSI Patient Record Forms[48]	
		5	WEMSI Patient Record continuation sheets	

Advanced Module[49]

Prescription-only items are noted by ℞

✓	Exp Date	#	Item and size/strength	Usual Dose
		2	℞ morphine sulfate 10 mg/mL, 1 mL vials[50,51]	pain: 2-10 mg IV Q10′-Q4H PRN 5-10 mg IM Q½-4H PRN
		4	℞ naloxone 1 mg/mL, 1 mL ampul (e.g., *Narcan*®)	excess narcotic: 1-4 mg IV/IM
		1	℞ midazolam 5mg/mL, 10 ml vial (e.g., *Versed* ®)[52]	sedation: 3-5 mg IV Q10′ seizure: 14 mg IM
		1	℞ ceftriaxone 2 g powder, and sterile water 10 mL, for reconstitution (e.g., *Rocephin*®)[53]	infection/open fracture: 2 g IV/IM
		2	℞ epinephrine 1:1000, 1 mL ampul: substitutes for Epi-Pen in basic kit	anaphylaxis/severe asthma: 0.3-0.5 cc SQ Q10′
		2	℞ diphenhydramine 50 mg/1 mL vial (e.g. *Benadryl*®)	allergy: 50-100 mg IV/IM
		4	℞ droperidol 2.5 mg/mL, 2 mL vial[54]	sedation/nausea: 2.5-10 mg IV/IM
		2	℞ dexamethasone 10mg/mL, 10 mL vial (e.g., *Decadron*®)[55]	
		6	alcohol prep pads, in foil	
		2	℞ 1 cc syringes[56]	
		2	℞ 3 cc syringes	
		2	℞ IM needles	
		2	℞ SQ needles	
		2	℞ 18 ga, long, over-the-needle IV catheters[57]	
		1	venous tourniquet (for starting IV)	
		2	saline lock[58]	
		1	20 cc bottle saline flush solution	
		1	℞ 6.5 mm endotracheal tube[59]	
		1	One-way valve for endotracheal tube[60]	

Search Module

Prescription-only items are noted by ℞

✓	Exp Date	#	Item and size/strength	Usual Dose
Pain Meds Etc.				
		30	acetaminophen tablets, 325 mg (e.g., *Tylenol*®)[61,62,63]	pain/fever: i-ii PO Q4H PRN
		4	℞ phenazopyridine hydrochloride tablets, 200 mg (e.g., Pyridium®)[64]	UTI symptoms: i PO TID
Cough, Cold, Allergy Etc.[65]				
		1	15 mL squeeze bottle oxymetazoline nasal spray (e.g., *Afrin*®)[66]	nasal congestion: i spray BID PRN
		8	12-hour sustained-release pseudoephedrine tablets 120 mg. (e.g., *Sudafed*®)	nasal congestion: i PO BID PRN
		8	12-hour sustained-release chlorpheniramine tablets 8 mg. (e.g., *Chlor-Trimeton*®)[67]	allergy symptoms: i PO BID PRN
		8	℞ *Humibid-DM® tablets*[68]	cough: i PO PID PRN
Eye				
		1	℞ 1 mL dropper tube tetracaine ophthalmic solution	painful eye exam: 2-20 drops
		3	fluorescein strips[69]	as needed
		1	2 mL dropper bottle cyclopentolate ophthalmic solution 0.5% or 1% (e.g., *Cyclogyl*®)	corneal abrasion or snowblindness: ii gtts Q3-4H
GI				
		8	famotidine tablets 10 mg (e.g., *Pepcid-AC*®)[70.71,72,73]	reflux/hyperacidity: i-ii PO BID PRN
Allergy				
		1	℞ 15 g tube fluocinolone acetonide cream 0.2% or similar high-strength steroid cream or lotion (e.g., *Valisone*®, *Benisone*®, *Lidex*®, *Kenalog*®, *Aristocort*®, *Uticort*®, *Synalar*®)	allergic rash/insect bites: apply to rash QID PRN
		1	℞ 1 oz. tube *Pramosone*® 1% or *Aveeno*® cream[74]	itching: apply to skin Q4H PRN
Altitude Etc.[75]				
		6	acetazolamide tablets 250 mg (e.g., *Diamox*®)	preventing AMS: ¼ tab (62.5 mg) PO BID

✓	Exp Date	#	Item and size/strength	Usual Dose
				treating AMS/HACE: 250 mg PO BID
		6	℞ nifedipine capsules 10 mg (e.g., *Procardia*®, *Adalat*®)	HAPE: 10-30 mg PO QID
Misc.				
		1	10 mL bottle clotrimazole solution (e.g., Lotrimin®)[76,77]	fungal skin infection: apply BID-QID yeast vaginitis: i mL intravaginally daily
		1	1 cc TB syringe, no needle (as vaginal applicator for above antifungal)	
		1	pair small sharp scissors (not necessary if available on WEMT's pocket knife)	
		1	pair fine-point splinter forceps (not necessary if available on WEMT's pocket knife)	
		1	SamSplint™ or equivalent flexible splint[78]	
		4	3" x 4" pieces of moleskin	
		10	small adhesive bandages (e.g., 1" x 3" *Bandaids*™, *Coverlet*™)	
		5	medium-size "suture strips"[79]	

Physician Addendum

This provides some general ideas for items that physicians may want to add to their kits; for purposes of standardization, recommend packaging this separately from the other kits.

✓	Exp Date	#	Item and size/strength
			penicillin
			ciprofloxacin (e.g., *Cipro*®) 250 mg. tablets
			caffeine pills[80]
			trimethoprim/sulfamethoxasole
			Duragesic® patches
			ketamine
			IV thrombolytic[81]
			a cobalt blue penlight
			a pocket otoscope and opthalmoscope
			prescription pad
			Merocel® epistaxis tampons
			a Foley catheter
			local anaesthetic
			saw for amputations[82]
			Kelly clamp
			needle holder
			suture material
		12	bisacodyl tablets 5 mg. (e.g., *Dulcolax*®)

Notes

(new notes since version 1.1 are in *italics*)

[1] Some have suggested to move 2/3 of each of the analgesics, etc. into the search kit, but this makes the kit as a whole more cumbersome; also, it makes it more likely that the minimum kit will be out of a medicine when needed.

[2] Some of the *over-the-counter (OTC) medications recommended for this medical kit do not have expiration dates stamped on them. For such medications, we recommend that WEMTs enter an expiration date two years from the date purchased and inserted in the medical kit.*

[3] In Minimum Kit because: WEMT-Basics may need to give pain medications to the injured to assist self-rescue.

[4] Oral pain medications may allow a patient to self rescue and thus are part of the Minimum Kit. The Advanced Kit contains injectable narcotics but a basic provider might have to use the kit and thus should have access to oral medications.

[5] *For all intents and purposes, naproxen has the same side effects and efficacy as ibuprofen, but can be taken only twice a day as compared to ibuprofen. Naproxen is also available without a prescription as an inexpensive generic. Some feel that choline/magnesium salicylate (e.g., Trilisate®), although a prescription drug, may be a better drug than naproxen. However, at present, this is still a minority opinion, and the majority recommend staying with an inexpensive OTC drug. See* http://www.pitt.edu/~kconover/ftp/trilisate.htm *for details and share your opinions with the wilderness-emergency-medicine Internet discussion list, instructions for subscribing at the beginning of this document..*

[6] Some suggested sublingual morphine as a noninjectable stronger narcotic; I've not been able to find any morphine products marketed for this use, nor any good information on any pill formulations that could be used this way. Also suggested was Duragesic® slow-release fentanyl patches; however, they take a long time to build up, and thus are not very appropriate for immediate acute pain. They might be acceptable for long-term pain relief during an evacuation, but that's not the purpose of this personal wilderness medical kit. They might make a good addition to a team kit.

[7] *In light of our attempts to lighten the kit, and the time span for which the kit is designed, we decreased the number of hydrocodone/acetaminophen tablets.*

[8] Comment> I would recommend using a metered dose inhaler rather than RotoCaps in a wilderness environment. Though it is controversial, many of my pulmonary colleagues think there are potential problems using RotoCaps in humid (i.e., coastal, rainy, the South in the summer) environments. When humid, the particles may aggregate and not be deposited effectively in the distal airways.
Reply> Interesting. I hadn't heard about this. A dispenser and the four rotocaps that fit inside (with a little trimming of the blister packages) is less than half the size of a metered-dose inhaler, and about a fourth the weight. And remember, we're asking people to carry this stuff with them _all_ the time. Is the extra weight worth it? Ask your pulmonary friends, add in your own memories of carring a pack during a long search, and please get back to me with your thoughts.
Another commentor also queried whether there would be problems with the Rotohaler working well in the field.
Re-Reply> When I queried the attendings I have heard express skepticism over the use of powder inhalers in the past, none of them could provide a reference to support their claims. On searching the literature, I could find little objective data to substantiate this as a big problem. In fact, the best article (Hiller et al, J. Pharmaceutical Sci 1980; 69(3):334-7.) indicated that ALL aerosols tested had increases in particle size at high humidity and that

MDI's [Metered Dose Inhalers] tended to be MORE unstable than powder-generated aerosols! Given these facts, I retract my concerns about use of powder inhalers and vow to distrust all of my attendings for at least 6 mos.
I still think MDI's might offer some advantages in terms of # of doses per oz. and more universal knowledge of technique, but I don't feel strongly enough to recommend one system over the other. The point may become moot over the next few years as CFC's are banned in other products and the price of MDI's goes up (maybe a lot) since the propellant will be less widely available.

[9] *Experience with severe asthmatics in the backcountry has led many to recommend more albuterol.*

[10]Comment> Does one need two sedating antihistamines (benadryl and chlortrimeton®? Perhaps Seldane® would be preferable to the latter.
Reply> 1. Don't like the Seldane/erythro interaction.
Reply> 2. Seldane is a poor antihistamine for acute (as opposed to chronic) use.
Reply> 3. We wanted both a short, strong-acting antihistamine (diphenhydramine=Benadryl®) for acute short reactions (beestings, dystonic reactions, etc.), and something longer-acting for more long-lived problems (rhinitis, poison ivy, etc.) and Chlor-Trimeton 12 mg extended pills are the least sedating good Q12H antihistamine we could find.

[11] In Minimum Kit because: may be needed to treat bronchospasm or allergy, and the epi and albuterol will wear off in relatively short order (hours).

[12] Comment> I would recommend more prednisone tablets. 60 mg is one dose for an asthma exacerbation.
Reply> Agree. Increased from 6 to 20 to allow multiple large doses for problems such as high altitude cerebral edema, severe allergy, or severe asthma.

[13] *Prednisone is available in 10 mg, 20 mg, and 50 mg tablets. The usual dose of prednisone for severe asthma or allergy is 40-60 mg daily, and lower dosese are rarely needed, so switching to 50 mg tablets decreases the weight and bulk of the kit slightly without any significant increase in expense.*

[14] In Minimum Kit because: motion sickness, vomiting and diarrhea may all immobilize a rescuer.

[15] Comment> I think Compazine® suppositories might be preferable to pills, but I recognize the storage problems etc.
Reply> People can grind up a pill, mix it with an M&M from their gorp, or some antibiotic ointment, and make their own suppository. *Many people questioned the utility of an oral medication for nausea and vomiting, other than a chewable pill for motion sickness (meclizine), and though the pills could potentially be used as a suppository, the utility seemed so low that we have removed Compazine®.*

[16] Comment> GI: Isn't meclizine an Rx in the U.S.?
Reply> If bought as Antivert®, yes; if bought as Bonine®, no.

[17] In Minimum Kit because: bites and stings occur unpredictably and these treatments must be applied immediately to be of any use. Local sting treatment is included because the pain from multiple stings may be disabling to a rescuer.

[18] Comment> Is Sting-Eeze of proven efficacy?
Reply (KC)> No good scientific evidence I'm aware of, but anecdotally it works like a charm. It's a witches' brew of all available OTC anesthetics and sting relievers. I've used it with good success myself; it really helps.

[19] *Fifteen cc's is a lot to carry for something that is used in 0.5cc doses, max. It is easy to repackage some of this in a small dropper bottle, e.g., a 4cc eyedropper type bottle, Cat No.: 0300710A from http://www.fisherscientific.com/.*

[20] In Minimum Kit because: aspirin so important in the early treatment of unstable angina or

MI, which is becoming more common in the wilderness.

[21] *We have decreased the dose, relying on naproxen and hydrocodone as analgesics, and reserving aspirin for use in chest pain.*

[22] Comment> Advanced stuff: I would add sublingual nitroglycerin and/or paste to the list.
Reply> They don't last long in a pack, especially in the summer and if being kept in a car trunk; keeping things updated in a SAR pack is a big problem, too. We decided to simply rely on nifedipine for vasodilation, coronary disease, etc. *See below.*

[23] *Nitroglycerine spray reputedly has a longer shelf life, and better heat resistance, than the pills. Also, nifedipine is much out of favor for the treatment of chest pain, due to the hypotensive effect. Therefore, we have moved nifedipine to the altitude section, because it is still invaluable for high altitude pulmonary edema, and added nitroglycerine spray. When going to altitude, the nifedipine and acetazolamide can be transferred to the Minimum Kit if desired.*

[24] Both erythromycin and ciprofloxacin originally in Minimum Kit because: might have patient with open fracture and wish to administer oral antibiotic immediately; might have team member with severe diarrhea who needs ciprofloxacin immediately; antibiotics may be lifesaving if the patient is ill with a serious infection rather than injured.

Comment> Rather than erythro, you might consider one of the newer macrolides. Azithromycin, though costly, offers the advantages of good GI tolerance (and we're in the woods after all) and the ability to carry a 2 week course in 6 pills.
Reply> Yes, but Zithromax® [azithromycin] is _very_ expensive, and these people need to buy their own drugs. If it were the same cost as erythro, would agree. It's also pregnancy category B, unlike Biaxin® [clairythromycin], so azithromycin is a better choice for that reason. However, unlike erythro, azithro is not a pediatric medication.
Many others suggested azithromycin as an alternative, and that samples are available; but doubt we can get enough samples for all who will need it.
Decreased from 40 to 24; this will provide 6 days of 250 QID, or 3 days of 500 QID. Resisted the temptation to go with just 500 mg tablets; 250 mg tablets allow spacing doses better for those with GI intolerance.
We had initially not considered azithromycin because of cost, but it now less expensive, covers most bacterial and atypical pathogens likely to affect team members in the backcountry, is safe in pregnancy and infancy, has few side effects, and can be taken once a day, improving compliance. Azithromycin is also now used routinely in all pediatric age groups, another argument in its favor. Some recent references include the following:

1. Hopkins S
Clinical toleration and safety of azithromycin
Am J Med 1991; 91:40S-45S
2. Kuschner RA, Trofa AF, Thomas RJ, et al.
Use of azithromycin for the treatment of Campylobacter enteritis in travelers to Thailand, an area where ciprofloxacin resistance is prevalent
Clin Infect Dis 1995; 21:536-41
3. Juckett G
Prevention and treatment of traveler's diarrhea
Am Fam Physician 1999; 60:119-24, 135-6
4. Hoge CW, Gambel JM, Srijan A, Pitarangsi C, Echeverria P
Trends in antibiotic resistance among diarrheal pathogens isolated in Thailand over 15 years
Clin Infect Dis 1998; 26:341-5
5. Khan WA, Seas C, Dhar U, Salam MA, Bennish ML
Treatment of shigellosis: V. Comparison of azithromycin and ciprofloxacin. A double-blind, randomized, controlled trial
Ann Intern Med 1997; 126:697-703
6. Shanks GD, Ragama OB, Aleman GM, Andersen SL, Gordon DM
Azithromycin prophylaxis prevents epidemic dysentery
Trans R Soc Trop Med Hyg 1996; 90:316

7. Murphy GS, Jr., Echeverria P, Jackson LR, et al.
Ciprofloxacin- and azithromycin-resistant Campylobacter causing traveler's diarrhea in U.S. troops deployed to Thailand in 1994
Clin Infect Dis 1996; 22:868-9
8. Bessette RE, Amsden GW
Treatment of non-HIV cryptosporidial diarrhea with azithromycin
Ann Pharmacother 1995; 29:991-3
9. Kuschner RA, Trofa AF, Thomas RJ, et al.
Use of azithromycin for the treatment of Campylobacter enteritis in travelers to Thailand, an area where ciprofloxacin resistance is prevalent
Clin Infect Dis 1995; 21:536-41
10. Uchino U, Kanayama A, Hasegawa M, et al.
[Effects of azithromycin on fecal flora of healthy adult volunteers]
Jpn J Antibiot 1995; 48:1119-30
11. Rakita RM, Jacques-Palaz K, Murray BE
Intracellular activity of azithromycin against bacterial enteric pathogens
Antimicrob Agents Chemother 1994; 38:1915-21

[25] Some have argued for the addition of various favorite antibiotics: cephalexin, among others. We have resisted the temptation to provide an antibiotic for every conceivable condition, instead trying for one with good gram positive coverage that can be given to just about anyone (azithromycin), and one with excellent gram negative coverage, including all common causes of infectious diarrhea and UTIs.

[26] *Azithromycin is now a second-line drug for infectious diarrhea, especially in areas where pathogens have developed resistance to quinolones such as ciprofloxacin; azithromycin is also a reasonably good drug for UTIs and therefore we have decided to eliminate ciprofloxacin from the drug list.*

[27] Can also be used as lubricant if needed.

[28] *Ophthalmic antibiotic ointment can be used for skin wounds, but not vice versa (the skin formulation is irritating to the eye).*

[29] Solid soap is not ideal, but is much lighter, and can be combined with some povadone-iodine solution for antibacterial effect.

[30] *Waterless hand sanitizer is now widely available in the U.S., and for clearing hands of bacteria and viruses, is reputedly as effective, if not more effective, than soap and water.*

[31] Comment> Do we need Hibiclens®?
Reply> Dunno about Hibiclens; might be nice, but again it's heavy. Plain soap (Dr. Bronner's, or whatever one's carrying) is probably OK.
Some suggested using foil packets of povadone-iodine solution; however, we've talked with enough people who've had them explode in their medical kits to stick with the more-rugged 15cc bottles.

[32] Can use antibiotic ointment as lubricant.

[33] *Many have found that heat or pressure in pack medical kits causes the covers provided with most digital thermometers to become unusable. A few small pieces of kitchen plastic wrap wrapped around the thermometer can serve as a substitute.*

[34] Comment> Why do we need thiamine?
Reply> To give to people who have been starving for a long time (i.e., weeks) when first feeding them, to prevent cardiovascular collapse (get a copy of the current Section 4 of WEMT Curriculum from http://www.wemsi.org/, if you want the details).

[35]Comment> I'm not sure I see the need for PO Haldol®.
Reply> EMT-Basics need to sedate patients, too.

[36]No stethoscope is included, as can simply place ear against the chest or abdomen for lung or

heart or bowel sounds; and, BP cuff and stethoscope too heavy and of only minor utility compared to the weight.

[37]Increased from 3 to 10 yards, and added the word "cloth," to allow for taping an ankle securely with the contents of just one personal medical kit.

[38]This was added due to the great difficulty of getting tape or even Bandaids™ to stick in wet weather.

[39] *We have found that a Nalgene® or similar HDPE bottle provides a much more durable form of benzoin; and benzoin loose in a medical kit can be extremely destructive. Eight-cc Nalgene bottles are available from suppliers such as* http://www.fisherscientific.com/*, Cat No.: 02-923-11A, NNI No.: 2002 9025, for approximately US$0.50 each in lots of 12, as of fall 1999.*

[40] *These were moved to the Minimum Module to allow for application of benzoin.*

[41] Some have suggested the addition of a triangular bandage; however, this can usually be improvised from something such as the tail of someone's shirt; or, duct tape can be used instead.

[42] This makes a compact but very absorbent dressing; some suggested adding various types of trauma dressing, but we opted to pick something that was very small, not wanting to increase the size of the kit. Of course, it can also be used as a tampon for a female patient with menstrual flow.

[43] Several people suggested adding these, as they are ideal field dressings: waterproof but vapor-permeable.

[44] *Moved to the Minimum Module both to protect team member wounds against contamination by patient body fluids, and to provide IV site dressings.*

[45] For trephining subungual hematomas.

[46] Will be provided by WEMSI.

[47] *Discussions about the appropriateness of wound closure in the field continue to rage, in the "street" prehospital community as well as in the wilderness EMS community. A detailed discussion is beyond the scope of this document, but the principles that guided us in adding this stapler included: 1) the wilderness is at least as "clean" as most Emergency Departments, at least in terms of virulent and resistant bacteria; 2) delayed primary closure at four days from the initial wound provides excellent results, comparable to primary closure; 3) repairing complex wounds is a skill that takes much training and experience, certainly beyond the scope of a standard Wilderness EMT class; 4) staples are easier to use than sutures, more secure than suture strips for patients or team members who are actively assisting in their own evacuation, stapling of simple wounds can be learned in a few hours, and is a relatively low-risk procedure; and 5) patients can bleed to death from relatively minor wounds, especially scalp wounds, and especially when coagulopathic from hypothermia, during long evacuations. Therefore, we are including skin stapling for simple wounds and badly bleeding wounds, especially scalp wounds. 3M Precise DS-5 staplers are available from many suppliers; in 1998, they were available for less than US$7.00 each from* http://www.pssd.com/.

[48] These can be downloaded from http://www.wemsi.org/and printed locally.

[49] Physicians may want to add: penicillin, caffeine pills for caffeine withdrawal headaches, trimethoprim/sulfamethoxasole, Pyridium®, Duragesic® patches, IV midazolam, IV ketamine, IV thrombolytic (Eminase® is at present the best choice, as can be used in a single dose, though quite expensive), a cobalt blue penlight, a pocket otoscope and opthalmoscope, a prescription pad, Merocel® epistaxis tampons, a Foley catheter, a small skin stapler, some local anaesthetic, wire saw for amputations, and a Kelly clamp, needle holder, and suture material, at least for tying off bleeders.

[50] *Recent studies e.g., [Turturro MA, Paris PM, Seaberg DC. Ann Emerg Med August 1995; 26:117-120. for example] show ketorolac no better for musculoskeletal pain than oral*

ibuprofen; therefore, we have deleted ketorolac (e.g., Toradol®). In this double-blind, placebo-controlled study, not only were 800 mg of PO ibuprofen and 60 mg IM ketorolac indistinguishable as far as degree of analgesia, they were indistinguishable in terms of time to analgesia!

[51] *We discussed dilaudid as a possible alternative to morphine; however, many more people know the dosage for morphine than know the dosage for dilaudid. And since it is possible, even likely, that this kit might occasionally be used by someone who is familiar with a standard paramedic drug like morphine, but not dilaudid, we elected to stay with morphine.*

[52] *Over the years, we have had many discussions about the possible use of midazolam, or another benzodiazepine such as Valium. Midazolam acquired a bad reputation when large doses (10-15mg IV push) were used for sedation for endoscopy, without either visual or pulse-ox monitoring of ventilatory status. However, smaller doses (4-6 mg IV push for the usual adult) provide excellent relaxation, sedation and amnesia for common wilderness procedures such as dislocation reduction. And, larger doses (0.2 mg/kg, about 14 mg for an average adult) can be used IM for control of seizures. It also has the advantage for wilderness reductions that it wears off in about half an hour, leaving the patient ready to assist in rescue efforts. As a result, we have added a single multidose vial in the most advantageous concentration. This represents more midazolam than is likely to be needed, but is still lighter than an adequate dose in many more containers. Other long-acting benzodiazepines such as Ativan® or Valium® were considered, but the short action and rapid IM absorption led us to chose Versed®.*

[53] Comment> I would consider increasing ceftriaxone to 2 g for a full 24 hrs supply.
Reply> Agree.

[54] *Droperidol is increasingly used for both sedation and nausea, and thus provides a single drug that can be used to substitute for two drugs, prochlorperazine (e.g., Compazine®) and haloperidol (e.g., Haldol®)*

[55] For treating high altitude cerebral edema, asthma or other bronchospastic problems, or severe allergy.

[56] *We have found that Tubex™ ampules are not appropriate for most wilderness kits. Many of the ampules, for instance the 10 mg Morphine ampules, are partly filled with air; and, when they get warm, the air expands, pushing out the red rubber plug and emptying the contents of the ampule into one's pack. Therefore, we have abandoned Tubex™ ampules entirely.*

[57] For relieving tension pneumothorax.

[58] *By adding saline locks and a saline flush, WEMTs at the scene can start an IV and give multiple doses of IV medications. Too, it is often easier to start an IV before the patient has lost much fluid, and when IV supplies arrive, the IV can easily be inserted into the saline lock. We discussed adding a small bag of IV solution to the search kit – for example, Navy SEAL team members always carry a 250cc bag of Hespan in a pants pocket – but finally decided that for civilian use, the usefulness was not worth the weight.*

[59] Can be placed by digital technique even without a laryngoscope.

[60] *The endotracheal tube can be placed (and covered with one thickness of a gauze pad to prevent insect entry) and used without artificial ventilation, for example, in airway burns. However, if mouth-to-ET-tube ventilation is necessary, a one-way valve provides the WEMT protection from contamination from the patient's airway secretions. One-way valves with filters are available, but are generally bulky and heavy, and provide only incremental protection over a good one-way valve. One small, light one-way valve that works with an endotracheal tube is that manufactured by Laerdal for use with pocket masks; the one-way valves are available separately from many suppliers, including item #36295 at http://www.mooremedical.com.*

[61] Comment> Does one really need aspirin and ibuprofen? Both decent analgesics and NSAIDs.
Reply> Yes, but aspirin can be used by itself for the anti-platelet effect, for example for a student at our last WEMT class; he had coronary-ish chest pain first relieved by SL NTG but

later returned and it was unrelieved by NTG. Aspirin is important for this. And, some people really do better with aspirin than acetaminophen or ibuprofen for minor aches, or at least think they do.

[62] Comment> Rather than cyclobenziprine, valium (though more of a hassle to get and keep secure) would be more versatile and is an effective muscle relaxant.
Reply> Recent research show that benzodiazepines don't really do much to relax muscles, and that Robaxin and Flexeril (cyclobenziprine) are more effective.
Comment> I would also favor the addition of an injectable benzodiazepine.
Reply> For sedation? Can use haloperidol for this. For muscle relaxation? See comments on Flexeril, above.

[63] *We finally concluded that the benefits of cyclobenziprine (e.g., Flexeril®) for muscle strains is really quite minimal compared to analgesics, rest and stretching. Therefore we removed this from the list.*

[64] UTIs are more common among women than men. Men: if you'd like to leave this out, please see the comments under antifungal cream.

[65] *The need for, or at least desire for, these medications can be supported by a trip to any local drugstore and a look at the shelves.*

[66] *As of September 1999, 3 mL "sample" or "travel" bottles of oxymetazoline nasal spray are not available in the U.S. However, Afrin® and some other brands of oxymetazoline nasal spray are now available in 15 mL bottles, which are relatively small and light.*

[67] We chose both long-acting and short-acting antihistamines because they have different uses. For example, stings or other acute allergic reactions usually need only short term treatment, and diphenhydramine can also be used as a short-acting sedative. whereas the sustained drying effect of sustained-release chlorpheniramine is ideal for viral URIs.

[68] *Dextromethorphan-containing cough drops are no longer generally available in the U.S. However, Humibid-DM, a combination of guiafenesin (a possibly-effective expectorant medication, reputedly to make it easier to cough out mucus) and dextromethorphan in a sustained-release combination that lasts 12 hours, is still widely available in pharmacies in the U.S. and, though it requires a prescription, is a lighter form of the effective cough suppressant dextromethorphan.*

[69] Comment> Eye: Fluorescein strips. Should a blue light be on the list?
Reply> Nice, but the fluorescein even works pretty well by daylight or mini-MagLite, and a blue penlight adds a lot of weight for only a little benefit, compared to the fluorescein strips, which weigh basically nothing.

[70] *Famotidine is an inexpensive, highly effective method for controlling gastritis or reflux – extremely common problems during SAR operations due to lack of sleep, stress, and excess caffeine consumption. Famotidine tablets are considerably lighter and smaller than enough antacid tablets to provide a similar effect.*

[71] It was suggested that we cut down on the number of these tablets; though constipation can be disabling, it's not usually as disabling as diarrhea. Changed from 6 to 4.

[72] *After long discussion, we elected to leave this out of the kit – although constipation occurs frequently in the outdoors and during SAR misions, and sometimes leads to abdominal pain, constipation is seldom recognized as the cause, and thus the demand for laxative pills is low in the field. A laxative is still appropriate for distribution as needed at the SAR base camp.*

[73] *Since we have a H_2blocker, and Imodium plus an antibiotic are better treatment for gastroenteritis, the bismuth tablets seem superfluous.*

[74] *Aveeno® cream has recently become available. Both Pramosone® and Aveeno® contains pramoxine, a topical anaesthetic that is non-sensitizing (non-allergy-provoking, unlike many other topical agents including diphenydramine, e.g., Benadryl®). Thus both are highly*

effective for the pain or itching of sunburn or poison ivy. Aveeno®, unlike Pramosone®, doesn't include hydrocortisone. However, the anti-itch and anti-allergy effects of hydrocortisone are minimal compared with the high-strength steroid cream, listed above. Aveeno® also includes oatmeal and calamine, which are also good topical anti-itch agents.

[75] Oral dexamethasone [e.g., *Decadron*®] not carried for high altitude cerebral edema, as 30 mg of predinsone is equivalent to the 4 mg dexamethasone dose usually used for HACE.

[76] Lotrisone® was suggested as an alternative for "shotgun" therapy of itchy rashes or vaginitis. At present, we are still staying with separate antifungal and steroid creams, as more effective and more flexible.
One suggestion was to use the new, highly effective antifungal terbinafine (*Lamasil*®) instead of miconazole. However, it is prescription-only, costs 2 to 10 times as much as miconazole, and there is no information on whether or not it can be used to treat yeast vaginitis.
Women reviewing this medical kit have almost universally demanded something for yeast vaginitis. Therefore, we discount suggestions that we drop this medication if the suggestion comes from a man.

[77] *We also discussed the use of an oral antifungal, as is commonly used to treat yeast vaginitis; however, these oral regimes are not currently accepted for jock itch and athlete's foot, which are also common wilderness afflictions. We realized that, to be effective for yeast vaginitis, antifungal cream needs to be applied with an intravaginal applicator, as comes with Monistat-7® and similar vaginal antifungals. However, such antifungal cream/applicator combinations generally include more than 15g of cream, and are relatively heavy – 3 oz. We realized that Lotrimin® solution is effective for the organisms that cause yeast vaginitis, athlete's foot, and jock itch. And a 10 mL bottle of Lotrimin® solution weighs only 1 oz. And a 1 cc TB syringe, without needle, makes an excellent lightweight vaginal applicator; one can easily pull the dropper top off of the Lotrimin® bottle and suck up a 1 mL daily dose of the Lotrimin solution and apply intravaginally.*

[78] Some suggested the addition of a traction device; however, a traction device can usually (though not always) be improvised with materials at hand.

[79] Removed butterfly strips as suture strips much superior.

[80] For caffeine withdrawal headaches.

[81] Eminase® is at present the best choice, as can be used in a single dose.

[82] *WEMSI conducted some informal research on methods of amputation in confined spaces – including races between different methods. The winner overall was a two-step process – using a serrated lockback folding knife to cut through skin, tendon, soft tissue; and then using a folding camp saw to cut the bone. This one topic engendered a long discussion on the wilderness-emergency-medicine Internet discussion list – see www.wemsi.org for the list archives.*