

The use and effectiveness of dogs in avalanche search and rescue

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THE MECHANICS OF SCENT

The body must be able to give off heat and by-products through the skin to survive. As long as it does, the components of scent escape also.

RAFTS:

We speak of rafts as dead skin cells. Surface dead or dying cells being pushed upward by living cells. The rafts are, on the average (0.014 mm) in size. They are shaped like cornflakes which gives them an aerodynamic characteristics. The raft may be composed of one or more cells. The skin surface has approximately two billion cells, of which about 1/30 are being shed daily. This works out to be about 40,000 cells shed by the body each minute.

It is generally accepted that humans have a scent and that it differs from one individual to another.

DETECTING HUMAN SCENT:

Search dogs are cued to any human being. The avalanche and disaster dogs are examples. These dogs detect the scent of a human being in a particular environment, whether it is snow or debris.

IN TRAINING:

While a dog is not 100% efficient, a fresh dog that likes his "nose work" will not bungle a reasonable problem. It is the handler who must make the judgement about what is reasonable or unreasonable.

Handlers should be aware that highly volatile substances such as gasoline can saturate the nasal passages so that the dog's sense of smell is blocked for up to several minutes.

SCENT DIFFUSION

Scent diffusion rate is not just a function of the snow density and porosity, but is also affected by the weather conditions.

Sometimes the scent may not quite reach the snow surface or if it does, it will not diffuse into the air. This is a function of the heat exchange that occurs at the snow surface. When the snow is losing heat by radiation or molecular processes (conduction and convection) the snow is also losing the scent into the air. A light wind greatly increases the removal of heat and scent.

When the snow is absorbing heat, scent diffusion from the snow surface slows or can even move back into the snowpack.

Air temperatures warmer than the snow surface, new falling snow, rain and surface hoar development can add heat to the snow and stop the diffusion of the scent into the air.

Keep in mind that if you arrive at the scene of an avalanche too soon, or if weather conditions are not optimal for scent diffusion, you may miss someone.

Dogs search large areas rapidly and usually find victims within 10 minutes when the scent reaches the surface readily (for example, in low density snow or for shallow burials not deeper than 2 m).

Greater difficulties are encountered in dense snow, during windy conditions, or if the avalanche deposition zone is contaminated by tree branches, pine needles, food, cigarette butts, clothing, urine, or gasoline.

TYPE OF SNOWPACK	TIME
Low density (powder, loose)	5 min/m
High density (heavy, wet)	15+ min/m

DOGS AND PROBE LINES

It is not uncommon for buried victims to be missed on the first (and sometimes second) pass by a probe line. The probability of detection (P.O.D.) from one pass of a "perfect" coarse probe line is only 76%. In other words, there is a one in four chance of missing on the first pass.

When a dog alerts in an area that has already been probed, it is important that the handler and site commanders learn to trust the instincts of the dog. Since probe lines perforate the snow, the potential of scent rising is much greater.

A well-trained dog is able to differentiate between surface scent left behind by searchers and the victim's scent diffusing from within the snowpack.

TYPICAL SEARCH TIMES^a TO COVER 10,000 m^{2(b)}

RESOURCE	TYPE OF SEARCH	TIME
Transceiver	1 <i>experienced</i> searcher	5 min
Transceiver	1 <i>inexperienced</i> searcher	15 min
Coarse probe	20 searchers	4 hr
Fine probe	20 searchers	20 hr
Dog	Coarse search (unfavorable conditions)	30 min
Dog	Fine search	1-2 hr

^afrom experience mainly in western Europe

^bequivalent to 1 hectare, 2471 acres or 110 yd x 110 yd

SEARCH STRATEGY

1. Scene size-up: evaluate existing and future hazards.
2. Post a guard in safe area to watch for further avalanches.
3. Use all other methods of S.A.R. prior to arrival of the dog team.
4. Keep snowmobiles and helicopters off the avalanche deposition area, preferably downwind.
5. Mark boundaries of deposition area, prior to trampling.
6. Avoid unnecessary contamination of scene. Do not throw items on to the slide path. (i.e. spit, cigarette butts, food, clothing, prevent dog or humans from relieving themselves in the search area.
7. Mark and probe all spots, or where articles are located on deposition area. If possible use a different color wand from the boundary markers.
8. When the dog team arrives, if feasible, move off the slide path to a safe area, preferably downwind. Take all personal articles with you.
9. The dog handler, with dog on lead, will access information from hasty team leader or site commander.
10. If a dog team is part of the hasty team and a transceiver signal is found, both dog and transceiver search should be started simultaneously.
11. Have any witnesses available to mark point last seen (P.L.S.). Remember the witness is not always correct with the P.L.S.
12. Supply a probe and shovel team to the search dog team.
13. Once the dog has been worked up and released (preferably into the wind), the handler should remain back from the dog, downwind and quiet. Only minimal directional commands should be used. Only if the dog becomes confused or looks to its handler for encouragement or direction should any be offered.
14. Mark all spots where a dog has alerted or shown interest (use wands marked with "DOG")
15. If poles, skis, gloves, goggles, etc. are on slide path area, turn them over and check to see if a hand or boot is attached. Stand them up, document or map them, remove, and wand the spot. When further help arrives, assign leader (not dog handler), initiate probe line, I.D. staging area.
16. Probe any alert that the dog shows no matter how subtle. An alert is indicated by the dog digging at the snow, barking, or aggressively sticking it's nose into the debris. Return with dog 10-15 minutes later if probers have not found the victim or clues.
17. After the dog makes the find, the handler should remove the dog from the victim, call the shovel team in, and reward the dog with its favorite toy.

MULTIPLE DOG TEAMS ON SCENE

1. Safe S.A.R. procedures apply.
2. Name one experienced dog handler as leader.
3. Lead dog team should stay behind for interview, while other teams begin search.
4. Assign search areas to each dog/handler team.
5. Switch search areas with other teams.
6. Stay informed on who has done what, and map areas.
7. If possible, photograph (Polaroid) search area.
8. If a dog alerts or marks a spot within the search area, probe the area.
9. A dog with mouth open is taking in only 50% of scent.
10. Watch your dog 110% of the time.
11. Know when to give your dog a break (every 30-60 minutes depending on conditions).

AVALANCHE DOG FINDS IN THE U.S.

YEAR	LOCATION	Number	Depth (m)	Burial Duration
1969	Mt. Rainer, WA	1deceased	1.4	unknown
1976	Sheep Mountain, AK	1deceased	1.4	3 days
1978	Taylor Creek, AK	4deceased	1	6 months
1980	Big Cottonwood Cnyn, UT	1deceased	2	7 hr
1981	Big Cottonwood Cnyn, UT	1deceased	1.5	2 hr
1982	Alpine Meadows, CA	1 alive	4	5 days ^a
1986	Twin Lakes, CA	1deceased	3	2 days
1986	Big Cottonwood Cnyn, UT	1deceased	1.5	45 min
1987	Big Cottonwood Cnyn, UT	1deceased	0.5	1 hr
1988	Plummer Peak, WA	1deceased	2	3 hr
1990	West Yellowstone, MT	1deceased	0.5	6 hr
1993	West Yellowstone, MT	1deceased	1.3	3 hr
1993	Jackson, WY	1 alive	2.1	1.5 hr
1994	Peters Ridge, MT	1deceased	3.7	24 hr
1996	Galena Summit, ID	2deceased	0.6	1.5 hr
1996	Arapahoe Basin, CO	1deceased	1	50 min
1997	Kenai Mountains, AK	1deceased	1.2	24 hr
1997	Girdwood, AK	1deceased	0.6	23 hr
1998	Cantwell, AK	1deceased	2.1	20 hr
1998	Little Cottonwood Cyn, UT	1deceased	0.5	1 hr
1998	Island Park, ID	1deceased	1.2	8 hr
1999	Little Willow, UT	1deceased	0.6	2 hr

^adog located person at 48 hours, rescued at 5 days