



# **SEVEN LAKES SNOWMOBILE CLUB**

*Serving the greater  
Wakefield, NH area.*



Len W. Abrahamson, President  
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## **CRITERIA FOR GROOMER PERSONNEL**

It is the policy of the Seven Lakes Snowmobile Club to foster the continued growth of its pool of professional groomer operators.

This policy will be achieved by complying with the policies established by the Board of Directors, the mandates of New Hampshire law, the Bureau of Trails and the New Hampshire Snowmobile Association.

With the approval of the Board of Directors, the Grooming Committee shall establish and implement the necessary training programs / procedures to comply with the above mandates for groomer personnel.

It is the Seven Lakes Snowmobile Club policy that groomer operators shall groom club trails with two people. This policy is in place to enhance safety to our operators, help serve and protect the snowmobiling community and landowners, and to mitigate liability.

It is the Seven Lakes Snowmobile Club policy that the Tucker Sno Cat shall not be operated on any frozen body of water such as lakes, ponds or rivers. Groomer operator experience, knowledge of the trail system, locations of hazards and good judgment are a prerequisite for crossing over wet areas.

It is the Seven Lakes Snowmobile Club policy that groomer operators refrain from consuming any alcoholic beverage and or drugs prior to and during the grooming operation. This policy is also directed to the person who is in the second seat of the Tucker Sno Cat. The club policy is zero tolerance.

It is the Seven Lakes Snowmobile Club policy that smoking is prohibited in the club house and the Tucker Sno Cat.

## **GROOMING COMMITTEE**

1. The Grooming Committee is established pursuant to the Seven Lakes Snowmobile Club Bylaws. The authority is found in Article VIII – Committees, Section 3 C Titles and Duties.
2. The Grooming Committee shall develop and implement a comprehensive training program for all new groomers and provide periodic in service training to the club certified groomers.
3. The Grooming Committee may solicit help from resources that possess expertise in grooming techniques to assist in the club training program.

### **MINIMUM QUALIFICATIONS**

1. Must be a Seven Lakes Snowmobile Club member in good standing
2. Be twenty one (21) years of age
3. Possess a valid motor vehicle license
4. Be free of any suspension / revocation of operator license in the past three (3) years
5. Possess physical strength, agility and quick reflexes
6. Be able to volunteer four (4) hours per month during grooming season

### **CERTIFICATION**

The candidate must:

- a) Have sixteen (16) hours (seat time) of operating experience with a certified operator prior to operating on their own
- b) Attend the safety training course which may be taken at either the trail master's annual seminar or given by a qualified member of the club

The grooming committee shall make any final decision as to whether any new candidate is certified after the 16 hour requirement has been met. The grooming committee will ensure that all operators understand their responsibilities for the safety of the public and club equipment. During the sixteen (16) hours of "seat time" with a certified operator the candidate will be exposed to the following information:

### **GROOMER OPERATOR TRAINING**

1. Demonstrate an Understanding of the Basics of Snowmobile Trail Grooming.
  - Understand trail grooming's general purpose, objectives, principles, and practices, alongside with common terms used in trail grooming.
  - Understand the basic characteristics and mechanics of snow.
  - Understand the role and importance of grooming managers and schedules.
  - Understand the source and level of funding for their snowmobile trails.

2. Know the grooming equipment they are operating and identify its key controls, components and features.
  - Know the capabilities, characteristics, and limitations of their grooming tractor and front blade.
  - Identify key controls and components of their grooming tractor and from blade (steering, throttle, brakes, lights, mirrors, hydraulics, tracks, engine, hitch, etc.)
  - Know the capabilities, characteristics, and limitations of their grooming implement(s) i.e. drag, roller and etc.
  - Identify key features of their grooming implements (frame, blades, wheels, tongue, hydraulics, skags, pan, lights, etc. as applicable)
3. Start, Operate, And Control the Groomer.
  - Properly conduct a pre and post operation visual inspection.
  - Operate and understand all in-cab controls, instruments, and gauges.
  - Start, stop, and park the vehicle.
  - Back the vehicle and hook it up to implements.
  - Operate the vehicle on the right side of the trail.
  - Demonstrate proper technique to get the vehicle unstuck.
  - Demonstrate front blade functions and operation.
  - Demonstrate the function and operation of rear implements.
4. Demonstrate Good Operator Safety Procedures.
  - Be prepared by carrying tools, safety equipment, and proper clothing.
  - Ensure grooming equipment is always visible with lights and reflective material.
  - Always wear seat belts and operate cautiously when using front blade.
  - Safely stop and park grooming equipment when on trail.
  - Safely secure grooming equipment that breaks down on the trail.
  - Avoid ice crossings.
  - Check equipment prior to departure.
  - Carry extra trail signs and replace when missing.
5. Demonstrate Proper Equipment Operation Techniques and Procedures.
  - Understand general grooming operating guidelines, including minimum snow depth, best time to groom, the optimal temperature range for grooming, and grooming procedures for when there is low visibility.
  - Understand grooming basics like: constantly watching the trail behind the groomer; don't leave holes, debris, or back-up piles on the trail; and know your trail so you can anticipate grooming needs and adjustments.
  - Understand proper grooming speed and problems caused by grooming too fast.
  - Understand the proper technique for grooming curves, hills, and bridges.
  - Understand the difference between building and maintaining a trail base.
  - Understand what to do when meeting snowmobiles on the trail.
  - Understand proper grooming width and direction of travel.

- Understand proper techniques for grooming with a drag.
- Understand proper techniques for use of a front blade.
- Understand proper techniques and tips for operating Tucker Sno Cats.
- Know the Top 10 **Operator Abuses**

6. Perform Proper Equipment Inspection.

- Understand the importance of preventative maintenance.
- Practice the Four Elements of Preventative Maintenance.
- Refuel the equipment.
- Perform pre-shift inspection.
- Periodically stop to perform walk-around inspection during grooming shift.
- Perform post-shift inspection, clean tracks belly pan.
- Notify grooming manager of equipment maintenance needs.
- Assist with pre-season, off-season, and regularly scheduled maintenance as requested.

7. Perform Proper Record Keeping.

- Complete daily groomer operator's logs and pre and post operation checklists.
- Keep accurate records of equipment use and maintenance.
- Submit equipment maintenance requests and corrective action forms.

8. Know the Local Area and Local Procedures.

- Know local trail routes and have maps available for snowmobilers.
- Know local trail signing guidelines.
- Know local laws and any special closures for sensitive areas.
- Know local emergency procedures and contact information.

### **TRAIL GROOMING PRINCIPLES / PROCEDURES**

It is important that the basic principles of snowmobile trail grooming are understood in order to properly operate trail grooming equipment and achieve the desired result of smooth, firm trails. Working a heavily moguled trail back into a smooth surface, that will last, is probably the most difficult aspect of trail grooming. To accomplish this successfully, it is important to understand the characteristics of moguls.

#### **Mogul Formation**

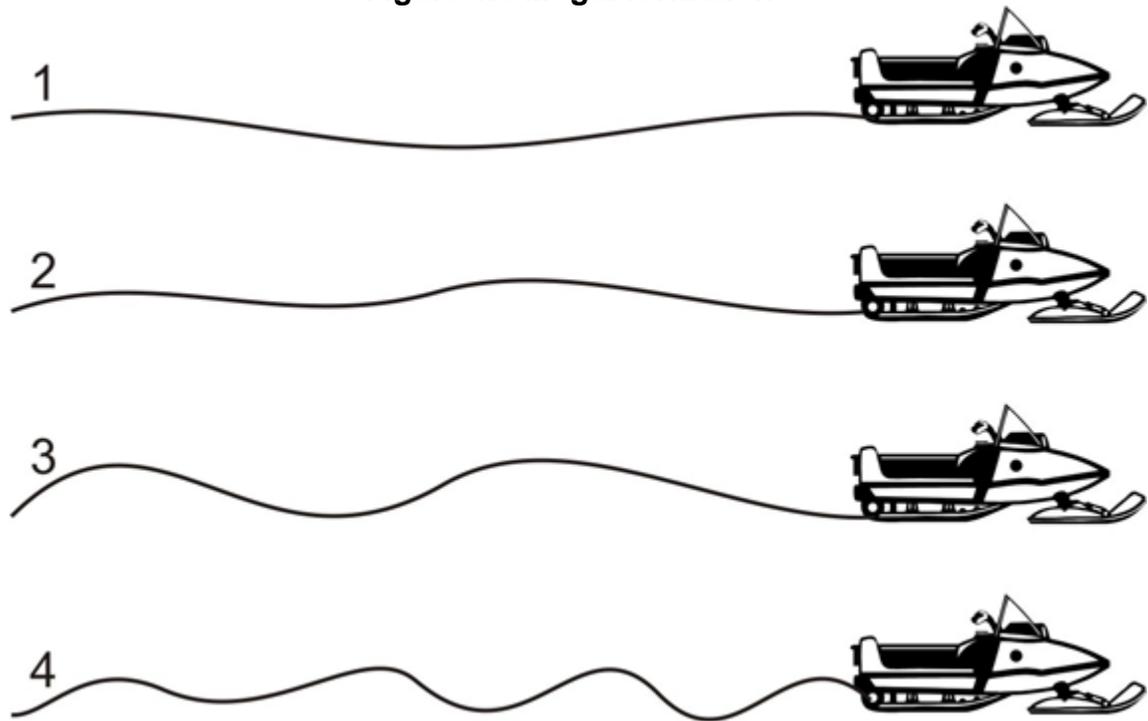
The primary reason snowmobile trail grooming is necessary is the continuous formation of moguls by passing snowmobile traffic. Moguls are patterns of mounds and dips formed in the trail's snow surface perpendicular to the direction of snowmobile travel.

Moguls in snowmobile trails are caused by passing snowmobiles just as "washboards" are created in gravel roads by passing vehicles.

Gravel roads have to regularly be graded. Similarly, snowmobile trails must be regularly groomed. Moguls are as undesirable to snowmobilers as washboards are to motorists.

Figure 1.5 demonstrates how moguls are formed. In the top view, a small rut is created in the trail by a snowmobile that has either braked suddenly or accelerated too quickly. Views 2, 3, and 4 show how the rut develops into a run of moguls as the suspensions of many successive snowmobiles react to the uneven trail surface, each one compounding the other, as each snowmobile passes.

**Figure 1.5 Mogul formation**



Today's modern snowmobile, with its carbide runners that cut the snow surface up to two-inch deep track lugs that dig out the snow, is an unintentionally effective digging machine. As a result, snowmobile riders innocently destroy the surface they desire to be smooth. Moguls tend to form wherever snowmobiles accelerate quickly or slow down abruptly. This can include before and after curves, approaching and leaving stop signs, before and after bridges, or on steep hills. These areas all require extra attention by the groomer operator.



Curves and areas where snowmobiles cut onto trails require special attention

Moguls also tend to form in long, coherent stretches or runs on relatively flat, open sections of trail. Each passing snowmobile, as the suspension extends and contracts, causes the mounds to get higher and the dips to get deeper the same distance apart from one another in a constant, unchanging rhythm that pounds both machine and rider and makes the ride most unpleasant. And the greater the speed, the more suspensions will expand and contract. In these locations, it can be important that a drag, with its length and planer effect, is used to level the trail versus trying to “groom” with the front tractor blade, which can often further accentuate the rhythm of this type of moguling. Moguls can also be caused by “natural formation” in situations



A snowmobile's skis, track, and suspension all contribute to mogul formation

Moguls can also be caused by “natural formation” in situations where there is warm ground or creeks under the snow, as well as by the alternating effects of sun and shade.

Four basic operations are required to produce a well groomed trail that is durable. They include:

- Step 1 – Removal of Moguls
- Step 2 – Processing the Snow
- Step 3 – Compression of the Processed Snow
- Step 4 – Trail Set Up

In most cases, grooming with a multi-blade drag will produce results superior to grooming with a single blade drag or a tiller since a multi-blade drag generally does a good job of accomplishing all four steps while a single blade drag or tiller accomplishes some steps better than others. For this reason, a multi-blade drag has been chosen to demonstrate the four grooming steps.

## THE FOUR STEPS OF TRAIL GROOMING

The primary purpose of grooming is to remove moguls and compact the trail base. This is not simply a matter of knocking off part of one mound and pushing the displaced snow into the adjacent dip. A “cut-and-fill” grooming operation produces an uneven snow density that can result in a poor riding experience. Even though the trail may initially look smooth, the trail will most likely quickly revert back to moguls as the soft snow is pounded out of the filled dips by passing snowmobiles.

### Step 1 – Removal of Moguls

Ideally, moguls should be completely cut away from the snow that forms the trail base. Beware that if the top is simply cut off a mound and dropped into the depression of the adjacent dip, it can result in the same mogul returning in no time at all. By completely removing the mound, all the way down to the bottom of the adjacent dip, the profile of the mogul is eliminated from the trail.

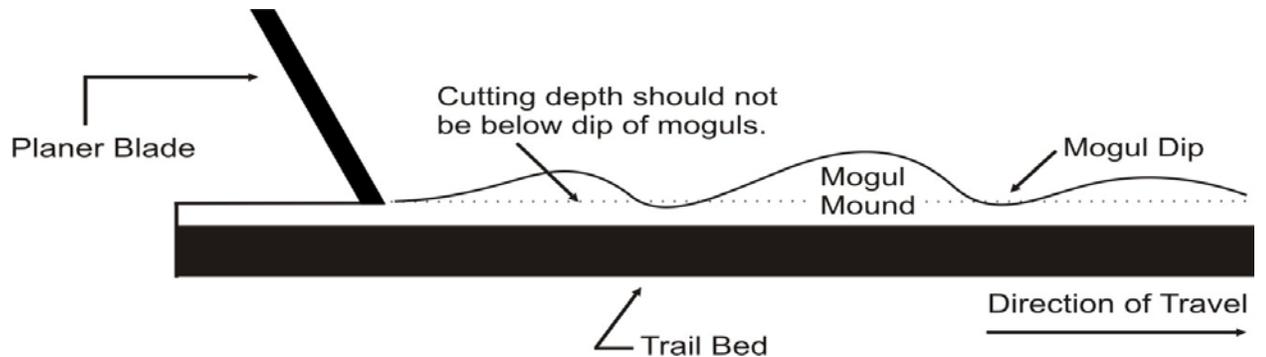
However, also beware to not cut into the layer of snow that forms the compressed trail base below the bottom of a mogul’s dip. The mogul should be removed, but not the solid trail base below it, so care must be given to cutting no deeper than the bottom of the dips that form the moguls. This requires that the cutting depth must be continually monitored and adjusted by the Groomer Operator.

There may be limitations to successfully removing the entire mogul: 1) if there is bare ground showing at the bottom of the dips in the moguls, do not attempt to cut the whole mound off since it could damage the equipment and result in destroying whatever hardened trail base there is; 2) if using a single blade drag and the moguls are deep, it is likely that snow could be lost out the sides of the drag when cutting deep enough with the blade to successfully remove the entire mogul. In this situation it is better to “save” the snow on the trail base rather than spilling it out the side where it may be “lost” for the purposes of grooming; 3) if using a tiller, the front blade on the tractor is the most effective tool for mogul removal prior to processing the snow with the tiller. However this has limitations since it cannot duplicate the planer effect of a drag; and 4) if using a multi-blade drag, it will not cut any deeper than the depth that the planer blades extend below the bottom of the side rails of the drag when it is fully lowered. If the trail bed is soft, the side rails may cut into the trail bed. But if the trail bed is hard, the rails will typically ride on top and limit the cutting depth. In all cases, the goal should be to remove all, or as much of the mogul as is reasonably possible, to produce a trail that will stand up better to snowmobiling traffic. Often times, multiple grooming passes may be required to achieve this.

Multi-blade drags accomplish mogul removal by using multiple sets of planer blades angled to cut *into* the moguls. As shown in Figure 1.6, the preset cutting depth of the planer blades are typically stepped slightly lower from the front to the rear of the drag, which results in the deepest cutting depth when the drag is fully lowered so it rides flat on the side rails.

Again, if the depth of the moguls exceeds the depth of the drag blades, multiple passes may be required to accomplish complete mogul removal.

Figure 1.6

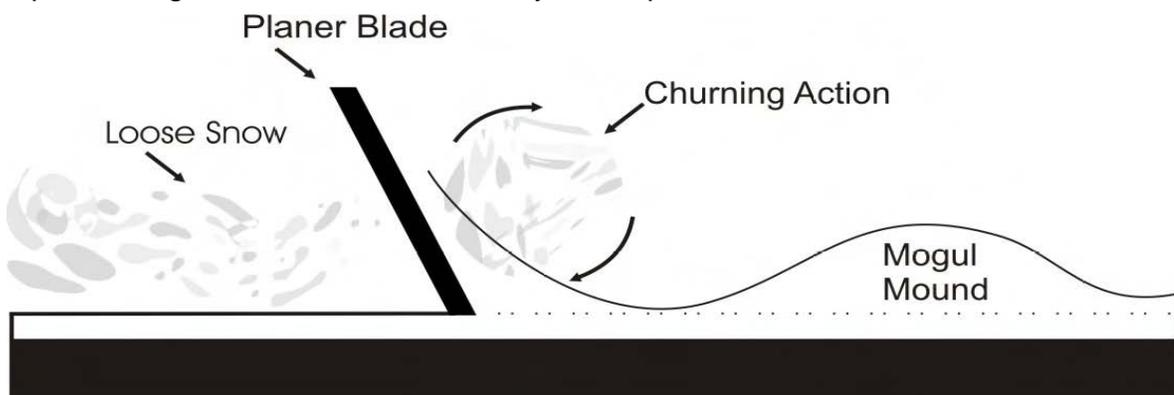


The planer blade cutting depth should cut to the bottom of the mogul's dip, but not into the compacted trail bed. When deep, fresh snowfall covers moguls on the trail, it may not always be possible or practical to completely remove the moguls. In such a case, it is critical that extra attention is given to Steps 2, 3, and 4 outlined below since a new, hardened trail base must be created to cover the profile of old moguls below the new layer of snow.

## Step 2 - Processing the Snow

At any given time, there may be several types of snow on a snowmobile trail – hard packed snow, soft snow, wet snow, dry snow, ice, freshly fallen snow, wind blown snow that is typically small granules and some of the hardest snow, or snow that has been pounded by snowmobiles and worked so hard by groomers that there is little consistency left in it. It is critical that all types of snow be “processed” to achieve proper trail compression and set up.

As shown in Figure 1.7, snow processing is accomplished by the establishment of a rolling or churning action in front of the blades as they move forward at a correct and constant speed. In many drag designs, the multiple blades are angled so the snow moves from side to side further mixing and homogenizing it. While the snow is being mixed, it is also de-aerated (air space between snow particles is removed to make it denser). When using a single blade drag, it is critical that this rolling action is achieved since there is only one blade/one shot at properly processing the snow. While a tiller does an excellent job of processing snow, it can be limited by the depth of its tines.



A churning action should be created in front of the planer blade to help process the compacted snow from the mogul into granules of various sizes. This churning, tumbling, or milling action removes air from the snow and, at the same time, breaks up the compacted snow from which moguls are formed into smaller granules of various sizes. It also breaks away points from individual snow flakes so they can be compressed more tightly.

The mechanical action of the churning and tumbling has another important purpose in that it can sometimes introduce moisture into the snow mix due to friction. This friction causes the temperature of the snow to actually rise, be it a very small fraction of a degree, which can create a small amount of moisture in the processed snow. This is especially valuable when snow is very dry. Introducing this moisture into the processed snow is also very important to the success of Step 4, achieving good trail “set up.”

It is critical that the rolling or churning action is achieved. If snow is allowed to ball up or plow along in front of the blades without this rolling action, the snow is not being properly processed (doesn't de-aerate, doesn't mix and break points, doesn't produce friction). This can be caused by the tractor traveling too fast (not enough time for the snow to properly roll and process), grooming conditions being too warm or too wet, or improper drag blade height (set too deep if “plowing” or too shallow if no snow in blade).

The height of the drag's blade(s) is critical to proper processing of the snow. If the trail is fairly smooth or only slightly moguled, only a minimum of snow will need to be processed since it isn't desirable to disturb any more of the trail base than what is needed to remove the moguls. In such cases, there may only be a need to have snow churning in the rear sets of blades on a multi-blade or only a partial blade full on a single blade. If the trail is heavily moguled or if there is lots of new snow, more blades on the multi or greater depth on the single blade will likely be required. Remember – process only as much as is needed to remove the moguls, but no more.

Proper ground speed is also critical to proper processing of the snow. Too slow and the proper churning, rolling, and mixing to produce the friction that is needed to improve trail set up is not achieved. Too fast and several factors work against effective grooming, particularly with multi-blade drags.

First, too high of a ground speed results in the angled blades spraying snow out the sides of the drag where it is lost and wasted for the purposes of grooming. Snow is precious to the grooming operation and most areas can ill afford to deliberately throw it off the trail.

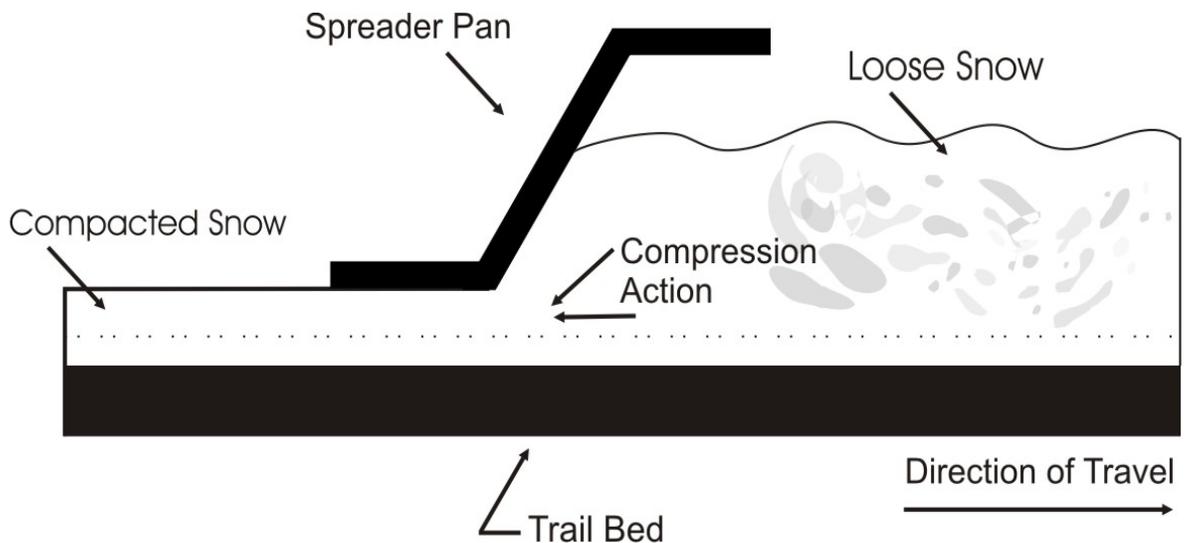
Second, the rolling and churning action is partially dependant upon forces of gravity, so proper time must be allowed for the snow to roll, churn, and fall out.

Third, going too fast can sometimes, in effect, over-process the snow and prematurely wear it out. Processing snow can be similar to using a blender – low to mid speeds can achieve good mixing and blending, but setting the speed too high can actually start to change the consistency and even liquefy what’s being processed. The same can be true with grooming in that the quality of the snow can actually be adversely affected by going too fast. And fourth, regardless if using a single blade, multi-blade, or tiller to groom, too high of a ground speed results in a side-to-side rocking that produces a rough versus smooth finished trail. Irrespective of the type of groomer, the best quality trails, in terms of both smoothness and durability, result from grooming at speeds between 5 and 7 miles per hour (8 and 11 kilometers per hour).

After the processed snow passes through the last set of blades or the tiller, there should be an even blend of loose particles ready for compression.

### Step 3 - Compression of the Processed Snow

The moist, loose snow created by the processing step must be “compressed” into an even covering of uniform density with a smooth surface. This process further de-aerates the snow and provides for a denser trail surface. As shown in Figure 1.8, this step is accomplished by a flat packing/compression pan at the rear of the drag.



The loose snow created by the cutting and churning action of the blades is distributed by the spreader pan and then compressed into a new layer of compacted snow on the trail bed.

On a multi-blade drag, the front of the pan is angled so loose snow that is contained by the side rails is captured and pulled under the spreader pan where it is then compressed by the weight of the moving drag. Since single blade drags typically do not have side rails, the snow must pass under the single blade of the unit and then be compressed by the drag’s pan. If too much snow is carried in the single blade, it spills out the sides.

This difference means that the multi-blade typically increases the finished snow depth/base of the trail with each pass, while the single blade increases trail depth only when there is an accumulation of new snow on the trail. While a tiller can apply down pressure when processing the snow, there is typically very little compression and generally is only from the unit's plastic comb.

#### **Step 4 - Trail Set Up**

Set up is simply allowing the snow that has been disturbed by cutting, processing, and compressing the proper time required to refreeze. Generally, the longer the set up time that is allowed, the more durable the trail will be and the longer the newly created smooth surface will last.

Once the drag or tiller has passed, the snow from the moguls should have been fully removed, processed, and redistributed as a new layer of denser, smoother "snow pavement."

The last step in the grooming operation allows the moisture that was created during the processing step to refreeze. This binds the individual granules of tightly packed snow firmly together, creating a hard surface that will withstand passing traffic much better.

The length of time needed for a trail to set up correctly can vary from two to six or even more than ten hours, depending upon the temperature and moisture content of the snow.



A freshly groomed trail that requires set up

Trail set up can be similar to freezing a tray of ice cubes – after a short time there may be a crust but the cube isn't entirely solid and it generally takes a few hours for it to become fully firm. A snowmobile trail is no different.

Therefore, it is vital that the trail remain as undisturbed as possible during this set up period for firmer, better quality trails that will stand up longer to snowmobiling traffic.

Figure 1.6

Ideally a snowmobile trail would be closed during set up time, but that isn't practical. Consequently, the best time to groom is generally at night when traffic levels are typically lower and air temperatures are generally colder. For the best set up, it is strongly recommended that grooming occur at night after snowmobile traffic subsides. This also provides for the safer operation of both groomers and snowmobilers since it is easier to see oncoming lights and beacons.



Try to groom at times when snowmobiles will not follow the groomer for best trail set up.

Most importantly, night grooming provides for more effective grooming since there is typically more time for the trail pavement to freeze solid before traffic resumes, maximizing the effectiveness of the area's grooming dollars. It is recommended that daytime grooming be done in areas only if there is little or no daytime snowmobile use on the trail being groomed. Other exceptions would include special circumstances such as when daylight would aid operator visibility for initial early season trail set up and establishment or for trail reestablishment of the trail after big storms, extremely heavy snowfalls, and/or significant wind events.

Updated and Ratified By:

Seven Lakes Snowmobile Club  
Board of Directors  
Effective November 14<sup>th</sup>, 2010

Updated: January 10<sup>th</sup>, 2010

Updated: December 8<sup>th</sup>, 2007

Grooming Policies and Procedures Created and Adopted  
February 28<sup>th</sup>, 2002

# Ten Common Operator Abuses

The following are ten common operator abuses of tracked snow grooming vehicles that can lead to premature equipment wear and equipment failure:

## **1. Failure to Perform Proper Warm Up.**

Neglecting warm up procedures can impair control responses and cut down on the life of the engine and transmission. Start the vehicle and check the steering, hydraulics, brakes, tracks, frame, attachments, etc. while it's warming up for at least 5 to 10 minutes.

## **2. Failure to Perform Walk-Around Inspection.**

There is no replacement for an operator's daily start up inspection. The operator must be very familiar with the machine. With daily inspections, the operator has the opportunity to check for loose fittings, bolts, oil leaks, and other problems that can be easily corrected and help prevent a major problem from developing. Have a checklist for each unit. Also stop each hour during operation and walk around the machine for a general visual inspection.

## **3. Operating When Repairs are Needed.**

If a vehicle is operated with known problems, even minor ones, it unnecessarily risks the vehicle's integrity and the operator's safety.

## **4. Operation Without Proper Training.**

Untrained operators, or even experienced equipment operators who are unfamiliar with the vehicle, may overload the equipment which can cause stress and damage the vehicle. An important part of every operator's training should be to read and understand the operator's manual before operating the equipment. Operators must always be attentive to odd sounds and the vehicle's response to controls.

## **5. Misapplication of Equipment to Job.**

All too often, tracked vehicles are used for purposes they were not designed for. A grooming vehicle is not a bulldozer and should not be used as one. Knowing and respecting the limits of the vehicle's capabilities is important to protecting the life and usefulness of the tractor, as well as the safety of the operator.

## **6. Going Too Fast.**

Tracked vehicles are designed to pull heavy loads at relatively low speeds. Operation at a high speed over rough terrain can damage the tracks or drive train and can also cause excessive vibration that can harm the tractor's frame and components. Additionally, working in too high of a gear overworks and overheats the transmission. It also generally produces a poorly groomed trail. Operators who chronically groom too fast should be replaced since they put the equipment at risk and produce poor quality trails that do not stand up well to traffic.

## **7. Unauthorized Modifications.**

Some operators believe that modifications to their equipment, like resetting hydraulic pressures or recalibrating the fuel pump for more horsepower, are smart moves. In reality, unauthorized modifications like these will often stress the vehicle beyond its limits. This can result in warranties being voided if a failure occurs or shorten the normal life cycle of the vehicle. Always check with the manufacturer before making any modifications to grooming equipment.

## **8. High Temperature Shutdown.**

Not allowing the engine temperature to stabilize before shutdown can damage turbochargers and cause premature engine wear. Always allow the engine to idle for 5 to 10 minutes before shutdown. This also provides an excellent time to perform a walk-around "shutdown inspection," as well as a time to warm up the operator's vehicle for the drive home.

## **9. Unfamiliarity with the Trail.**

Operators who are unfamiliar with a trail can run into sudden hidden dangers such as rocks, trees, wet areas, and steep grades that can pose a threat to themselves and the vehicle. Operators who helped construct the trail or who performed summer maintenance on the trail are a valuable asset since they know what the area looks like without snow cover. They are also the best people to have set the outer edges of the groomed trail at the beginning of the season. Know the trail and stay on it. Groom with a plan and stick with the plan. Operators should follow the trail signs and NEVER follow snowmobile tracks through open areas unless they're absolutely certain that is exactly where the trail is located. Snowmobilers often shortcut bends in the trail and can get the groomer into extreme trouble if it follows them off-trail.

## **10. Using Attachments Improperly.**

Even if the front blade can remove a large drift in one pass, make several passes and do it in smaller, less stressful cuts. Saw limbs into several small pieces before pushing them off the trail with the front blade.

**Use it, but don't abuse it!**