

CALIFORNIA SNOMOBILE TRAIL GROOMING

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CALIFORNIA OFF-HIGHWAY MOTOR VEHICLE RECREATION COMMISSION



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Department of Parks and Recreation
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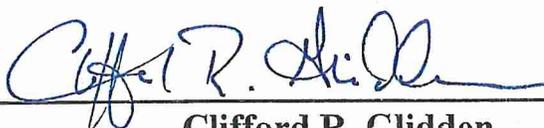
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1997

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INTRODUCTION

The State of California has provided money for snowmobile trails, facilities and enforcement since 1975. Thirty four (34) trailheads and 8 Sno-Parks provide access to 1,500 miles of groomed trails with staging areas, warming huts and 2,337,000 acres of open riding areas which are funded through State contracts and grants. There are currently 23 grant funded grooming operations that are operated on United States Forest Service (Forest Service) lands either by agreement or contract by Forest Service personnel, and/or volunteers. These grooming programs are located from east of Bakersfield in the Southern Sierra to the Oregon border in the Cascade Mountains and high plateau regions of North Eastern California. The State currently has 14,000 registered snowmobiles. The program is administered by the Off-Highway Motor Vehicle Recreation Division of the Department of Parks and Recreation by the Winter Recreation Program Coordinator.

In order to provide better customer service, a survey was developed to determine what facilities and types of trails should be funded by the program. The survey, conducted during the spring and summer of 1996, showed that grooming was the most important item to be funded with OHV funds. As a result, in 1996 a grooming committee was formed from contract operators, Forest Service personnel and volunteer operators (see Appendix A). This committee's objective is to increase efficiencies in the current grooming program. This committee did not study the issue of who should groom, only how it should be done. The policies and requirements that are implemented as a result of this study may reveal the need to determine a State policy on who should receive funds for grooming.

The Grooming Committee (Committee) was divided into subcommittees as follows:

1. Grooming Standards
2. Equipment, Preventative Maintenance, and Training
3. Other States' Grooming Programs
4. Glossary

The resulting report was circulated to each of the western state snowmobile coordinators, the US Forest Service, grooming volunteers, manufacturers of grooming equipment and private contractors for review and comment. Each comment was reviewed to determine if it should be included in the report or addressed through training.

Training programs for both the grooming coordinators and the operators will be provided. It is anticipated that the Grooming Program will continue to evolve as the recommendations and guidelines are implemented in this report.

GROOMING

Grooming is not an activity that can be placed on a rigid schedule. Some of the conditions that dictate grooming times and frequencies are: temperature, storms, usage, type of snow, avalanche hazards and terrain. Decisions on when to groom should be based on these factors and the guidelines below. The time to conduct grooming and the implements to be used should be based on the judgment of the trail groomer operator following the standards that have been developed by the committee.

GROOMING OBJECTIVE

The purpose of the State Grooming Program is to provide a high quality snowmobile trail system that is smooth and safe for the rider. The groomed trail should be designed so that the novice rider can use it without difficulty.

GROOMING THEORY

Grooming is conducted to obtain a long lasting trail that is mogul free and is a consistent density. The denser the snow, the longer the trail will last. There are two methods most commonly used to obtain a dense snow condition; snow conditioning and snow compacting. These methods are often used together. Regardless of the method chosen, the prepared or groomed surface should set undisturbed for at least 2 to 18 hours to permit freezing to take place. Once the snow has been allowed to freeze, it becomes hard and is more difficult to disturb. The best grooming is accomplished when the air temperature is 35 degrees F with the temperature dropping. When conditions allow, the trail should be groomed or track packed during a storm to build the trail from the bottom up, otherwise the proper snow pack density cannot be maintained. Improperly packed snow will melt faster during warm temperatures.

SNOW CONDITIONING

Snow conditioning is the mechanical process (tilling) where the snow is moved back and forth in an effort to breakdown the points on the ice crystal. This process produces a slight rise in temperature and a small amount of surface melting of each crystal. Moving the snow breaks down the points on the crystal and the small amount of melting provides lubrication assisting this process.

SNOW COMPACTING

Snow compacting is the mechanical process which results in the compression of the snow. Newly fallen snow is loose with a thin layer of air between each snow crystal. It must be packed to increase its density. The snow can be compressed to less than half of its original depth by forcing the air out. This is accomplished by applying a weighted object to the snow surface until no significant additional compression is observed.

GROOMING MECHANICS

Grooming should start when the snow depth is approximately 12 to 18 inches. Initially the snow should be packed with no attempt to move or place the snow. If deep powder snow arrives before grooming begins, movement of the snow using the front blade maybe necessary. Large grooming drags with a pan or roller do an excellent job of compacting provided the process is started before too much snow has fallen. **If compacting cannot be accomplished any other way, the snow should be track packed-preferably twice, once without and once with a compacting device. Finally, after compacting, the snow should be groomed.**

Once the snow is compacted and allowed to freeze, it will form a suitable base for the trail. The trail should be built from the bottom up. If possible, do not let the trail become too rough before it is smoothed. The rougher it becomes, the more difficult it is to get it smooth again.

Conditioning and compacting the snow after each snowfall and as often as needed to maintain a dense base and smooth surface. Grooming the trail between substantial snowfalls requires snow conditioning and smoothing. As a general rule, significant accumulations of fresh snow (12 inches to 18 inches or more) needs conditioning and compacting. Old snow requires conditioning to create a smooth and safe riding surface.

GROOMING STANDARDS

The grooming coordinator/experienced operator using these standards will make the final determination on when and how to groom.

1. **It is most effective to begin grooming when the snow depth is at least 12 to 18 inches.** Grooming may start as early as November and may end as late as May. Generally the typical season will begin in December and end about March 15. *Your season will be dictated by snow conditions, usage and funding.*
2. When visibility and safety conditions allow try to pack or groom during a storm in which accumulation is expected to be substantial. Build the trail from the bottom up. The groomer operator will need to make the determination if snow conditions will support the snow tractor before grooming is started.
3. The ideal air temperature range for grooming is 35 degrees F with the temperature dropping. The type of snow will dictate the temperature at which the best results will be realized. In general, wet snow grooms best at night because it needs a lower temperature to set up and dry snow grooms best during the day.
4. Groom when the snowmobile traffic is lightest, if possible, so that the trail surface will have time to harden.
5. Cut off all moguls as deep as possible (halfway down or more) to fill the low spots and voids in the trail. Do not cut the moguls to the bottom if it will result in bringing dirt into the snow. Condition the snow with a grooming device to balance density and depth. Moguls should not be evident after grooming is complete.

6. When conditioning the snow with a Maxi drag, adjust the cutting depth of the blade so that you will be carrying 3/4 of a blade of snow. Get the snow rolling or tumbling in front of the blade. This does not apply to wet balling snow. Usually wet or balling snow only requires that you cut the high areas and fill the voids.
7. If the amount of snow is marginal, set the front blade so as to pull the snow from the outer edges of the trail to the center.
8. Generally, if you till twice, use the second pass to widen the trail and if needed use the blade to provide additional fresh snow to the tiller.
9. Use grooming speeds in the range of 3 to 7 miles per hour. Always be below the speed where you notice a bouncing effect. Grooming at too high a speed will result in a washboard surface and will cause equipment to wear out more quickly.
10. Snow drifts should be groomed as level as possible.
11. Trails should be groomed at a minimum of 10 feet wide, with wider trails when necessary due to traffic and other conditions. Where the terrain allows, main ingress and egress trails that connect to the trailhead should be groomed to 14 feet wide or greater to facilitate the added traffic.
12. It is best to identify hazards prior to grooming. Foreign material along the groomed areas should be removed beyond the clearing limits. Each trail should be checked in the fall before the first snow and obstructions removed. Materials which cannot be rerouted around shall be brought to the attention of the grooming coordinator and flagged by the groomer operator as a hazard. All blown down trees should be removed in accordance with US Forest Service requirements unless snow depth makes it impractical.
13. Exercise caution during grooming to avoid creating hazardous conditions.
14. Snow tractors should be operated with the rotating beacon and lights on at all times.
15. Operators should maintain communication with a base station. If that is not possible or practical, a second person should accompany the primary operator, either by riding in the cab or on a snowmobile and be in constant contact with the operator.
16. All snow tractors shall be equipped with appropriate safety gear and spare parts. It is recommended that a snowmobile be carried on the snow tractor to provide transportation in case the tractor breaks down.
17. A vertical clearance limit for snow tractors of 10 feet should be maintained to keep clear of obstructions.
18. The grooming tractor should not be used as a tow vehicle, except in emergencies.
19. **The snow tractor shall be operated on approved trails only.** They are not to be used on private property unless it is part of the approved trail system.
20. Use of the snow tractor for search and rescue and should be approved by the grooming coordinator after being requested by the local sheriff's department authorized representative. The grooming coordinator should be aware of the county sheriff's search and rescue policies. A qualified operator should drive the snow tractor.

21. Where feasible the grooming routes should be planned and developed to reduce dead head mile loop systems create preferable routes. The routes should also be laid out to accommodate the vehicle range and normal operating shift.

OPERATOR GUIDELINES

The grooming coordinator shall provide the training and direction to the operators so that they can meet the following guidelines:

1. Provide daily and routine service and maintenance on the equipment in compliance with manufacturer's suggested schedules, procedures and materials. Keep a detailed, accurate and legible daily record of these duties by documentation in a log book (see Appendix D).
2. Maintain a safe and clean work environment at all times during grooming, transporting, repair and maintenance activities. **Do not participate in any unsafe activities.**
3. Use the Operation Log to note the names of all riders, (including volunteers) problems, unusual events, snow conditions, temperature and weather (see Appendix E). **The Operation Log should have a trail system map that is marked daily to indicate areas that have been groomed.**
4. As directed by the grooming coordinator, install or replace designated trail signs as needed. Report any signing needs to the coordinator. Where appropriate, all hazards should be marked. The operator is responsible for making sure that an adequate number of caution signs are carried on the snow tractor.
5. Operate the equipment only when authorized to do so and on **officially designated snowmobile trails.**
6. Be in good health and maintain sufficient strength to efficiently and effectively utilize all machinery and equipment typically associated with the snowmobile trail grooming equipment.
7. Each grooming operator must be trained in the operation of the snow tractor, in the routine maintenance of the machine, first aid and winter survival (including avalanche training where appropriate).
8. Be prepared to respond to the public comments pleasantly. Be prepared to hand out approved maps and other materials to assist the visitor. Good public relations helps provide a positive image for the grooming operation and for snowmobiling.
9. Snow groomer operators will not render assistance to the public on the trail system unless in the operators judgment it is an emergency and that lack of assistance will result in public injury or death. The operator should call for assistance when necessary.
10. Report all accidents to the local sheriff and document it in the log book.
11. No consumption of alcoholic beverages, drugs or other intoxicants, before or during operation of the equipment, will be allowed.
12. A snow tractor is not designed as a snow plow. The operator should not clear parking lots at trailheads with the snow tractor.
13. A snow tractor is not designed to push trees. All trees shall be cut up and dragged or winched out of the way.
14. Cooperate with the State inspector at all times.

GROOMING COORDINATOR

Each grooming operation shall have a grooming coordinator. The grooming coordinator can be a volunteer or agency employee. The coordinator will be responsible for the operation of each grooming program and the maintenance of all the equipment for the program whether it be by paid staff, volunteers or contractors. The coordinator will approve each person involved in the grooming program, arrange the training of staff and volunteers and will ensure to the State that the program is carried out within the framework of the Standards developed in these guidelines. Although it isn't necessary for the coordinator to be a grooming operator, such experience is helpful.

The coordinator will ensure that the trail systems, personnel and equipment are ready before the start of the season. All obstructions should be removed from the trail prior to the start of the season. The coordinator will make sure that summer maintenance of the snow tractor and equipment is complete, staff is trained, all gear (including safety gear) is useable, log books are up to date, and operators are aware of the trail system routes along with changes to the routes. The coordinator should make sure that the operators are trained in the state grooming guidelines, snow tractor safety tips, and snow tractor abuses (see Appendices F and G).

The coordinator shall keep the State informed in a timely manner of any problems in the grooming program that will effect their ability to carry out the program to State standards. For example, a serious blow down of trees that will cause major rerouting of the trail system or the breakdown of the grooming equipment that will delay grooming for more than three days at a time the State should be informed as soon as possible.

The coordinator should ensure that patrols of the groomed trail system are conducted to ensure compliance with the grooming standards. The patrols can be conducted using volunteers or paid staff. If complaints about grooming are received, they should be investigated and resolved quickly.

Each coordinator of a groomed trail system funded either solely or partially by the State must attend a State training program (organized by the Grooming Committee) on the Grooming Standards within six months of being placed in the coordinator position. As part of the training, the coordinator will spend at least 4 hours riding in the snow tractor to observe the grooming process.

The coordinator will provide the State with information requests on the grooming program and will make the grooming equipment and records available for inspection by the State when required.

The coordinator shall work with commercial outfitters, commercial guides and snowmobile concessionaires to obtain contributions for the grooming costs, proportional to their trail usage. This contribution should be used to augment *Green Sticker* supported grooming.

TRAINING

Training is an important part of any successful grooming program. For example, the State will develop and provide training programs for all grooming coordinators, starting in the fall of 1997. In addition, the State will sponsor maintenance workshops for various types of snow tractors. These will be patterned after the Tucker Sno-Cat workshop that was held in Rocklin, September 1996.

Operator training requires many hours in the snow tractor both observing and operating the equipment. It also requires an understanding of snow characteristics and must be geared towards the equipment to be operated. A Tucker 2000D requires different training than a BR-180. This is not the type of training that the State is equipped to provide. Instead, a list of trainers for different types of equipment will be developed and made available to each grooming coordinator during the fall of 1997. Some of the current operators may also receive this training. In addition, a training video will be developed that will demonstrate grooming procedures.

EQUIPMENT PURCHASING SPECIFICATIONS

The following is the minimum specifications for equipment purchases. Re-manufactured equipment, demonstrator's equipment and new equipment must meet these specifications or obtain a waiver from the State representative. Contract groomers will need to provide equipment that generally meet the specifications regarding horsepower, fuel capacity, safety equipment and sealed meter. For other contract groomer specifications see *Contract Grooming and Specifications*. Modifications to existing equipment must be approved by the State.

- * Diesel engine
- * Engine block heater
- * Minimum 180 Horsepower
- * 12 hour capacity fuel tank
- * Tilt steering wheel or hydrostatic control
- * 12 way blade with wings that are greater at full swing than the width of the track or the width of the drag
- * Power hydraulic system capable of operating the front blade simultaneously with a minimum of three rear hydraulic circuits for operation of implements
- * 3 ply track belts with overall width of at least 36 inches
- * At least four locations with tie down hooks for transport
- * Cold weather start system
- * 2 person cab with seating for 2 persons
- * Suspension seat for driver
- * 12 volt starting and ignition system with alternator of sufficient capacity to operate all accessories
- * Battery master switch
- * Dual battery system with minimum of 1150 full cranking amps
- * Tiller must have full 9 foot cutting width or more and should have a center drive
- * Overall length without attachments shall not exceed 18' and overall track width shall not exceed 13'
- * Rear Pintle Hitch
- * Cooling system shall maintain the operating temperatures within manufacturers recommend range
- * Key type ignition switch
- * Full engine instruments
- * Tachometer
- * Electric horns
- * Hour meter
- * Speedometer
- * Pyrometer
- * Transmission must be capable of handling 400 foot lb. of torque and/ or hydrostatic transmission with oil cooler and heater
- * Transmission pan heater for other than hydrostatic transmissions
- * Cab heater capable of keeping the cab warm with outside temperatures of 20° F
- * Full front brush guard to protect windshield and light
- * Locking doors
- * Windshield wiper system front and rear
- * Tinted glass
- * Interior lights
- * Backup lights (2 floods and 2 spots)
- * Rotating beacon
- * At least 4 halogen headlights

- * Roof mounted spotlight
- * Heated mirrors
- * Rear window defroster or other system for keeping window defrosted
- * Window defogger system or other system for keeping both front and rear windows clear
- * Parking brake
- * Backup alarm
- * AM/FM radio
- * Mounted 5lb. ABC fire extinguisher
- * Color of tractor shall be safety orange, yellow, or red
- * All components shall be rated "heavy duty"
- * Warranty covering parts and labor for a period 500 hours of operation for defects in parts or workmanship
- * Complete maintenance and training manual and spare parts list
- * Complete onsite demonstration of snow tractor and operator training of at least 16 hours
- * OHMVR logo affix to outside of both doors

Add optional alternates as follows:

- * Mounted sealed tool box
- * Warn 9000 pound electric winch or equal. Front and rear mounts with plug in wiring
- * Cargo carrier
- * Interior fan

CONTRACT SPECIFICATIONS

SPECIFICATIONS AND REQUIREMENTS FOR SNOWMOBILE TRAIL GROOMING

Contractors usually lease or buy their grooming equipment. Either way, there is a substantial financial commitment involved in the grooming program that is currently amortized over one year. It would be better for both the contractor and the State's grooming program, if the equipment could be amortized over three years. A longer contract also allows the contractor to become better acquainted with the trail system involved. Due to the significant savings to the State, each contract, as it is renewed, should be issued for a three years. This can be contingent on the performance of the contractor and availability of State funding. The committee recommends that each contract (new or renewal) include the following information:

1. **Trail Grooming Tractor Specifications.** A self-propelled, over-the-snow tracked vehicle, constructed specifically for snow grooming, is required. The vehicle must be capable of being operated under varying conditions ranging from snow trail to cross-country travel in deep snow covered mountainous terrain. The vehicle must meet the following general requirements and be accepted by the State representative:
 - A. **Maximum Hours.** Maximum hours of use on the vehicle shall not exceed 5,000 hours, unless proof of substantial reconditioning is provided. Exceptions to the 5,000 hours maximum limit must be approved in writing by the State representative.
 - B. **Vehicle Width.** The total overall width of the vehicle shall not exceed _____ feet.
 - C. **Track Width.** Each track must be at least _____ inches in width.
 - D. **Travel/Climbing Abilities.** The vehicle must have sufficient track and power to pull a _____ foot wide approved grooming drag with all attachments, under full load on a sustained basis, up all grades that will be encountered on the particular trail system at site elevations up to _____ feet.
 - E. **Engine.** The vehicle may be gasoline or diesel powered. The gasoline or diesel engine must have adequate power rating to meet the performance requirements. Engine displacements shall not be less than: _____.
 - F. **Front Blade.** The vehicle shall be equipped with a front-mounted, hydraulically-operated blade with a minimum of 8-way functions.
 - G. **Hydraulic System.** The vehicle shall be equipped with a power hydraulic system capable of operating the front mounted blade simultaneously with a minimum of 2 rear hydraulic circuits for operation of the trail grooming drag. Tiller drive vehicles are recommended.
 - H. **Lights/Safety Equipment.** The vehicle shall be equipped with a minimum of 2 electric sealed-beam front headlights, a minimum of 1 electric sealed-beam rear back-up light and 1 roof-mounted flashing amber beacon. All lights must be maintained in good operating condition at all times. The flashing amber beacon must be operated at ALL times the vehicle is in use.

1. **Hour Meter and Speedometer.** The vehicle shall be equipped with an hour meter and speedometer which is in good working condition. The hour meter and the mileage must be entered on the Daily Grooming Work Log or the log will be considered invalid.
2. **Trail Grooming Drag Specifications.** A pull-behind, snowmobile trail grooming drag is required to accomplish snowmobile trail grooming. The grooming drag must meet the following general requirements and be accepted by the State representative.

- A. **Drag Width.** The total overall width of the grooming drag shall not exceed _____ feet.
- B. **Drag Length.** The total length of the grooming drag shall be at least _____ feet, excluding the tongue, (tiller excluded).
- C. **Condition.** The trail grooming drag shall be in good working condition. It shall be capable of leaving a smooth trail surface at all times with no irregularities caused by a damaged, bent, dented or broken rear packer-pan. The drag should not duck-walk or leave chatter marks on the finished trail surface. The drag should be of sturdy construction to withstand hard or crusted snow rocks, logs, trees and heavy wet snow; yet, light enough to have floatation in deep powder snow.
- D. **Components.** The trail grooming drag shall have the following components:

Hitch: A pintle type hitch with a hydraulically activated tongue is preferred. A 5th-wheel hitch may be acceptable upon approval of the State representative.

Cutting Blade: The grooming drag must provide full-width cutting action. A single full-width blade or a series of cutting blades which provide a full-width cut is acceptable. The cutting blade must be hydraulically operated to provide a full range (up and down) of cutting ability and to provide clearance in deep powder snow conditions. Cutting blade or blades must have the ability to provide good rolling action with the snow which is carried.

Rear Packer-Pan: The grooming drag must provide full-width compacting. A corrugated surface or a smooth surface is acceptable on packer pans. The packer pan must be at least 5 feet in length and the full width of the drag. The packer pan must be rounded up in the front to facilitate good grooming and on the rear to enable backing-up. The packer pan must provide an evenly finished trail surface, clear of holes or divots.

3. **Other grooming implements.**

- A. **Tillers.** Tillers are recommended for grooming. They shall be adaptable and sized to the contract specifications. Tillers must be matched properly to a tiller drive cat. Flex tillers are acceptable, but not preferred.
- B. **Compactor Bars.** When conditions of deep snow exist, compactor bars are acceptable for preparation for trail grooming.
- C. **Track Packing:** Track packing is allowable and is considered preparation for grooming. This is necessary in heavy/deep snow conditions, or at seasons beginning with snow depth of over 18". All track packing and compactor bar grooming is to be properly groomed as soon as possible.

4. **Snowmobile Trail Maintenance Requirements.** Must be done to State standards and guidelines found in this report.

- A. **Finished Trail Width.** The trail shall be groomed to a finished width of 10-14 feet, depending on space availability because of terrain or contract requirements.
- B. **Temperature Range.** Trail grooming should be done at operators discretion when temperatures reach 35° F and dropping.
- C. **Grooming Time.** Most grooming should occur at night, although weather and use may require operation during the day. Most grooming will likely occur Monday through Friday, although weather or traffic may require weekend grooming. When weekend grooming is necessary, night grooming is usually the most desirable. Grooming times should be based on operator discretion using the State guidelines.
- D. **Grooming Frequency and Priorities.** The grooming frequency and priorities for each trail segment are at the operator's discretion, based on contract requirements and temperature, snow, condition of trail, frequency of use on trail, and trail work. Sections of trails may be groomed more frequently than others depending on use frequency.
- E. **Back-Up Plan.** In the case of equipment failure or of operator absence, it is the responsibility of the contractor to ensure that the trails are being groomed according to schedule. It is the contractor's responsibility to contact _____ immediately when a back-up plan is needed.

5. **Special Provisions.**

- A. **Abide by Operating Plan/Agreement with Appropriate Land Managers.** The contractor shall review and abide by all terms and conditions of the current Snowmobile Administration Operating Plan.
- B. **Submission of Work Logs.** The contractor shall complete a Daily Trail Work Log at the end of each work day.
- C. **Grooming Frequency and Priorities.** Grooming frequency and the grooming priority for each trail segment is to be at operator discretion. Consideration should be based upon contract requirements and temperature constrains.
- D. **Contract shall provide bonding in the following amount: \$ _____**
- E. **Contract shall provide references for the last three seasons of grooming.**
- F. **Certification or Training of the operators shall be listed as follows:**

- G. **Contract Length:** Recommend 3-5 years with 4 years optional renewal.

H. Equipment Inspection.

State owned (mandatory): The State owned snow tractor and implements shall be made available for inspection upon request of the State representative. All log and operation books shall be available for inspection at that time. The State representative shall try to schedule the inspection so as not to interfere with the grooming schedule of the contractor.

Private owned (optional): A state inspection of the privately owned snow tractors will only occur if equipment breakdowns are frequent enough to jeopardize achievement of the grooming guidelines or if the equipment appears to be incapable of achieving the guidelines.

- I. **Two-way Trail.** Each direction on a trail is considered grooming and is mileage. **Mileage on trails is based on total miles the tractor has operated, not one-way distances.** Advertised miles (one-way miles reported to the public) of groomed trails are not the same as actual miles of grooming conducted. For example, grooming a 6 mile road in both directions to obtain an extra wide road that exceeds the width of the implements being used will count as 12 miles groomed.
- J. **Trails to be as Flat as Possible.** Trail runs to be groomed as flat as possible.
- K. **The contract shall be paid by the total miles groomed during the season up to the total bid amount or State funding level.** In a long season, if additional State funding becomes available then the contract can be extended based on the per mile bid rate. Dead heads shall be groomed each way and the return trip counted in the mileage. Heavy snows or extreme conditions, side work, track packing, windfalls, and culvert work shall be paid by the hour and converted to miles as follows: One hour of time equals 5 miles of grooming. The grooming log should reflect the work accomplished on the per hour basis.

The contract may be terminated by either party with cause or due to lack of funding with a thirty (30) day written notice, delivered by certified mail.

The contract will be for a three (3) year period, with an option to extend up to two (2) additional one year periods, by agreement of both parties in writing and subject to the required approvals. There is no right or expectation of extension and any extension will be determined at the discretion of the Agency.

It is most effective to begin grooming when the snow depth is at least 12 to 18 inches. Grooming may start as early as November and may end as late as May. Generally the typical season will begin in December and end about March 15. *Your season will be dictated by snow conditions, usage and funding.*

All information submitted by the contractor will be held in confidence and, if requested by the contractor in writing, will be returned to the applicant after evaluation of the portfolio.

VOLUNTEER GROOMING AGREEMENTS

Green Sticker funds should not be expended each year to renegotiate volunteer agreements. As long as the volunteers are performing to the State standards, the agreements should be issued for a 3 year period. A successful volunteer program should be based on the Grooming Guidelines established in this report. Cooperation and good communication between a club and the Forest Service is essential in providing a strong, effective program. Volunteer operators are required to meet the same training and safety requirements as the Forest Service operators. Where the club and the Forest Service have had continuing disagreements that are not resolved, both California/Nevada Snowmobile Association (CNSA) and the State can assist in mediating a solution. After analyzing the various types of agreements, the *Agreement For Sponsored Volunteer Services* is recommended (see Appendix C for a sample volunteer agreement).



OTHER STATES' GROOMING PROGRAMS

The committee researched how grooming is done in the western states and by the Ontario Federation of Snowmobile Clubs using their *Snowmobile Trail Development Manual*. Even though the eastern states and Canadian provinces have huge programs, the weather, terrain and snow conditions are very different than California, so less emphasis was placed on their grooming requirements. The committee collected as many contract specifications and grooming requirements as possible. The committee looked primarily for those procedures that were consistently used throughout the agencies program. The State of Wyoming has draft contract specifications that were reviewed very closely. The State of Oregon's grooming requirements varied greatly depending on the area. In one area they required grooming every Wednesday or Thursday evening and in another area they only indicated that they needed to groom. The State of Washington has just implemented a new system this year where grooming times and places must be approved and inspected by regional grooming councils.

The following is a summary of the grooming programs for other western states.

1. Colorado - They have 23 grooming areas which are operated by local snowmobile clubs. They groom 2,000 miles of trail with about \$202,000 of yearly State funding. The State originally purchased the snow tractors for the program and now the clubs are responsible for their replacement and maintenance. They buy mostly used ski resort Piston Bully's.
2. Idaho - The State purchases the snow tractors and have given 31 to the counties for operation and 1 to the Forest Service. About 40% of the operators are volunteers.
3. Montana - The State grooms about 3,100 miles of trail using 16 snow tractors that are owned by the State and leased to snowmobile clubs. An additional 6 areas are contracted out directly by the State. They average about 2 groomings per week on their trail system.
4. Oregon - The State provides \$600,000 to their snowmobile association which uses the money to contract out 2 areas and operates an additional 22 club operated snow tractors. They use mostly Tucker Sno-Cats to groom the 3,000 miles of one-way trail.
5. Utah - The State operates 9 snow tractors (LMC) using \$475,000 in state funding. They groom a 900 mile trail system with seasonal employees who are paid about \$7.50 per hour. It costs about \$15.20 per mile, not including replacement of equipment, to operate their program.
6. Washington - The State purchases the snow tractors and gives them to the Forest Service to operate. The State has formed 10 Grooming Councils made up of 5 to 10 club members and 1 non-club member. The Councils decide when and which trails are to be groomed. The operation and maintenance of the snow tractors is accomplished with grants. The State has moved snow tractors when the grantee could not perform to the States expectations. The grooming frequency is determined by the size of the grant. Some of the secondary trails are only groomed 3 times during the season.
7. Wyoming - The State has 4 purchased snow tractors operated by State employees. In addition, they contract out to 1 snowmobile club, 2 counties and 13 private contractors for the operation of the remaining grooming. Their contractors must furnish their own equipment.

APPENDIX A
GROOMING COMMITTEE

APPENDIX A

GROOMING COMMITTEE

Ari Makinen
Lake Tahoe Winter Sports
PO Box 11521
Tahoe Paradise, CA 96155

Forest Service Contractor

Chuck Best
19308 Maple Ave.
Weed, CA 96094

Forest Service Operator/
Snowmobile Club representative

Barry Jones
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OHMVR Division
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Winter Recreation Program Coordinator

Rick LaBorde
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Forest Service Operator

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22830 Foresthill
Foresthill, CA 95631

Forest Service Operator

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Hollister Hills, CA 95023

State Heavy Equipment Mechanic

Charlie Olmsted
13250 Hwy. 89
Old Station, CA 96071

Forest Service Contractor

Norm Sovereign
6637 Myrtle
Paradise, CA 95969

Forest Service Volunteer/
CNSA Groomer Representative

APPENDIX B

DEFINITIONS

APPENDIX B

DEFINITIONS

Communication - A system that allows the grooming operator to communicate with a base unit.

Compacting bar - A flat pan used to compress the snow and pack it.

Dead head miles - Return trip over the same trail.

Groomed miles - Total miles put on snow tractor during the process of grooming the entire trail system. One mile by 10 feet wide equals a groomed mile.

Groomed trail - When snow has been successfully processed to provide a safe, comfortable and enjoyable trail for a motorized vehicle to travel upon.

Groomer operator - The person who operates the machinery to groom the snow.

Grooming - The mechanical alteration of the snow to provide a safe smooth surface for travel.

Grooming Coordinator - The official in charge of the snowmobile and state grooming program.

Grooming Drags - A multi-blade implement used to remove moguls and smooth trail.

Grooming Log Sheet - Records the date and trail system groomed, the hour of operation, miles groomed if known, time in and out and general comments.

Grooming Implement - Equipment such as blades, compacting bars, drags and tillers used in the alternation of the snow surface.

Grooming operator - A person who has been certified or trained in the safe and practical operation of a grooming tractor, grooming implements, as snow processing and public safety.

Grooming Speed - A speed which provides for a groom trail approximately 5 mph.

Grooming Tractor (Cat) - Tracked vehicle designed to traverse snow with the potential to use implements to groom.

Hours of operation - The time that the grooming tractor is in operation as recorded by the hour meter.

Maintenance Log - Written documentation kept in tractor to provide operator with repair information and service intervals.

Miles of trail - One way miles of trail in system including loops and dead ends.

Moguls - A pattern of mounds and dips or ruts in a trail.

Preventive maintenance - Scheduled service program recommended by manufacturer.

Service interval - Defined by each manufacturers, but generally about 100 hours of operation between required oil changes, etc.

Snow preparation - Mechanical preparation before finish grooming.

Tiller - A mechanical, hydraulic powered rotary implement with blades that breaks up snow and ice

Track packing - Using the cat to pack the snow without the use of implements.

Trail miles - The actual one way distance that can be traveled over the trail system.

APPENDIX C

AGREEMENT FOR SPONSORED VOLUNTARY SERVICES

AGREEMENT FOR SPONSORED VOLUNTARY SERVICES

(Act of May 18, 1972, P. L. 92 - 300, as amended)

1. Name of Sponsor/Organization: _____
 (Please Print)

2. Address: _____
 (Street City State Zip Code)

3. We desire to make available the volunteer services of the following person(s) to assist with Forest Service Work:

See "Exhibit - A" attached.

4. Description of work to be performed:
Grooming of snowmobile trails at Bucks Lake, maintenance of snowmobile trail signs (including putting them out in the fall and removing them in the spring), maintenance of facilitates and equipment that support the winter OHV program.

The Bucks Lake Snowdrifters agree to provide volunteers for all grooming duties. Scope of the grooming as described in OHMVR "Grooming Guidelines" will be followed for the Bucks Lake groomed trail system.

5. The above-described work will be contributed to the Forest Service. Except as provided below, the work performed by the participants will not confer on them or on our employees, or officers, the status of federal employees.

6. We will provide the Forest Service with a list of participants and man-hours contributed to accomplish the work in item 4 above.

7. We will obtain parental or guardian consent for each individual under 18 years of age and will comply with child labor laws.

8. Norm Sovereign is hereby designated to serve as our liaison with the Forest Service in day-to-day operation under this agreement.

9. We understand that either the Forest Service, or we, may cancel this agreement at any time by notifying the other party.

10. Remarks: (If more space is needed, use separate sheet)

11. Signature (Designated Liaison for Sponsored Group/Organization) _____ Date _____

ACCEPTANCE FOR THE FOREST SERVICE

The Forest Service agrees, while this arrangement is in effect, to:

1. Provide such materials, equipment, and facilities as are available and needed in performing the work described above.
2. Provide necessary incidental expenses of sponsored participants to the extent such expenses cannot be borne by the sponsor, and to the extent Forest Service funds are available. The maximum Forest Service funding of such incidental expenses shall be set forth on the reverse of this form or in an accompanying plan for each fiscal year or portion of fiscal year.
3. Consider the participants as federal employees for the purpose of tort claims and compensation for work injuries, to the extent not covered by the sponsor.
4. Authorize sponsored participants to operate federal motor vehicles when necessary, provided participants are licensed to operate a motor vehicle.

5. Signature: (FS Officer)	6. Title	7. Unit	8. Date
----------------------------	----------	---------	---------

Forest Service reimbursement for sponsored participant's necessary incidental expenses are as follows:

	Yes	No	
a. Subsistence	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(amount if Yes) \$ _____ remarks: _____
b. Transportation Allowance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(rate if Yes) _____ remarks: _____
c. Provide Lodging**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	remarks: _____
d. Other:			_____

** Reimbursement for lodging will be limited to expenses incurred by sponsored participants while attending meetings, training, and workshops. No lodging expenses will be reimbursed for participants involved in the duties described in item 4 page 1 entitled "Description of work to be performed". Authorization for lodging must be in writing and approved in advance.

*** All reimbursements for subsistence will be submitted by the sponsor. The sponsor will compile all requests into one claim listing names, dates, and miles for each volunteer.

TERMINATION OF AGREEMENT

1. Agreement Terminated on (Month, Day, Year):	2. Signature (FS Officer)
3. Remarks: (If more space is needed, use separate sheet)	

ACCOMPLISHMENT (Optional)

RESOURCE CATEGORY	NIRP CODE	UNIT OF MEASURE	AMOUNT ACCOMP.	HOURS CONTR.	COST TO GOV'T	APPRAISED VALUE (DOLLARS)
(a)	(b)	(c)	(d)	(e)	(f)	(g)

APPENDIX D

SNOW TRACTOR MAINTENANCE RECORD

**PREVENTIVE MAINTENANCE SCHEDULE AND
SAFETY INSPECTION WORK SHEET**
GSA FGA REV. 2/93

DEPARTMENT OF GENERAL SERVICES
OFFICE OF FLEET ADMINISTRATION

8

PREVENTIVE MAINTENANCE SCHEDULE AND SAFETY INSPECTION WORK SHEET

9

PROVIDE THIS INFORMATION ON REPAIR ORDER:

LICENSE NO.	OWNER'S AGENCY & ADDRESS	DATE
YEAR	MAKE & MODEL	ODOMETER/MILEAGE

NOTE: Maintenance schedule and safety inspection program is to insure that state vehicles are well maintained, safe to operate, perform reliably, and are in compliance with manufacturer's warranty provisions. Confirm services due by reviewing the STD. 271 Maintenance Booklet, found in the glove compartment.

METHANOL VEHICLES (contact an Inspector of Automotive Equipment)

Service intervals should be performed as follows:

SERVICE A

5,000 miles or 6 months normal use or 4,000 miles severe use.*

- Change engine oil and filter.
- Check the following:

- | | | |
|--|--|---|
| <input type="checkbox"/> Lights & instrument panel | <input type="checkbox"/> Cooling system (antifreeze + _____) | <input type="checkbox"/> Suspension |
| <input type="checkbox"/> Heater & air conditioner | <input type="checkbox"/> Belts & fan clutch | <input type="checkbox"/> Frame members |
| <input type="checkbox"/> Seat belts | <input type="checkbox"/> Fuel system | <input type="checkbox"/> U-joints/CV joints |
| <input type="checkbox"/> Windshield wipers | <input type="checkbox"/> Fluid levels | <input type="checkbox"/> Exhaust system |
| <input type="checkbox"/> Battery | <input type="checkbox"/> Methanol cooler | <input type="checkbox"/> Transmission |
| <input type="checkbox"/> Differential | <input type="checkbox"/> PSI: Front _____ Rear _____ | <input type="checkbox"/> Brakes** |

- Steering components, check for excessive play with wheels on the floor.
- Contact an Inspector if not expected to last another 5,000 miles.**
- Replace air filter every 12,000 miles or annually.
- Road test vehicle for overall performance and handling after repairs have been completed.

SERVICE B

24,000 miles or 24 months normal use or 12,000 miles severe use.*

- Perform Service A Replace spark plugs Replace fuel filters

Reference Manufacturer's manual for definition of normal and severe use.*

SMOG CHECK

- General Services' pool vehicles are smog checked biennially on the odd/even VIN# system.
- Perform a vehicle smog check as applicable to government fleets.
- Attach the BAR 90 printout to the invoice. NOTE: Certificate is not required.
- Contact an Inspector if:
 - The "G" file number is not known.
 - The vehicle does not meet BAR 90 specifications.

BILLING INFORMATION

- Itemize charges on invoice as follows:
 - Labor (hourly or flat rate time)
 - Parts and prices
 - Discounts applied.

CONTACT AN INSPECTOR OF AUTOMOTIVE EQUIPMENT IF THERE ARE ANY QUESTIONS.

APPENDIX E

SAMPLE VEHICLE OPERATION LOG

SAMPLE SNOW TRACTOR OPERATION LOG

DATE: _____ TIME - START: _____ FINISH: _____ TOTAL TIME: _____

HOURL METER - START: _____ FINISH: _____ TOTAL EQUIP. HRS: _____

ODOMETER - START: _____ FINISH: _____ TOTAL MILES: _____

TOTAL MILES TRAIL SYSTEM GROOMED TO STANDARDS: _____ MILES: _____

PRIMARY ROUTE GROOMED - MILES: _____ SECONDARY ROUTE GROOMED - MILES: _____

CHECK ONE: TRACK PACKED _____ COMPACTOR BAR _____ IDAHO SPECIAL _____ TILLER _____

PRE-SHIFT CHECK LIST

FLUID LEVELS: (OIL, FUEL, HYDRAULIC FLUID, RADIATOR, BATTERY, TRANSMISSION) OK _____
LIGHTS, HORN, GAUGES, WIPERS, MIRRORS, WINDOWS, HEATER, RADIO, OPERATIONAL OK _____
TOOLS, SURVIVAL GEAR, SHOVEL, EXTRA PARTS AND SUPPLIES OK _____
VISUAL INSPECTION COMPLETED (TRACKS, CARRIER WHEELS, FRAME, HOSES, BELTS): OK _____

SUPPLIES USED

FUEL: _____ GAL. / ATF: _____ QTS. / OIL: _____ QTS. / ANTIFREEZE: _____ GAL.

OTHER: _____

OPERATING CONDITIONS

AVERAGE SNOW DEPTH: _____ FEET / WEATHER: _____ / TEMP: MAX: _____ MIN: _____

OPERATOR'S: FS _____ VOLUNTEER _____

OPERATOR COMMENTS



Daily Vehicle Operation Log

Su M T W Th F Sa

Operator: _____ Shift: _____ Date: _____
 Hour Meter: Start: _____ Finish: _____ Total Hours: _____ Down Time: _____ Idle Time: _____
 Operators Time: in: _____ out: _____
 Weather Conditions: _____ Implements Used: _____

Pre-shift Check List: (Warm Equipment for 10 min.)

___ Eng. Oil ___ amt. Added	___ Belts	___ Gauges	___ Grousers	___ Flashlight
___ Hyd. Oil ___ amt. Added	___ Tire Pressure	___ Wipers	___ Track Belts	___ Shovel
___ Radiator ___ amt. Added	___ Lights	___ Radio	___ Tire Guides	___ Cab Pin
___ Battery	___ Back-up Alarm	___ Battery	___ Track Tension	___ Fuel
	___ Fire Extinguisher	___ Tools	___ Emergency Brake	___ Lug nuts

Checked out by: _____

Shift End, Shut Down: (Idle for 10 minutes before shut off)

Fuel Amount: _____ Percentage of tanks used: _____ Water Separator Checked _____ Shoveled off _____
 Machine Parked _____ Implements down _____ Brake on _____ Plugged in _____ Key off Radio and Tele off _____

Average Gauge Readings: Engine RPM Setting _____
 Engine Temperature: _____ Oil Pressure: _____ Hydraulic Temperature: _____

Areas Worked (Trails Groomed)

Explain down time & any repair work needed:



Daily Vehicle Operation Log

Su M T W Th F Sa

Operator: _____ Shift: _____ Date: _____
 Hour Meter: Start: _____ Finish: _____ Total Hours: _____ Down Time: _____ Idle Time: _____
 Operators Time: in: _____ out: _____
 Weather Conditions: _____ Implements Used: _____

Pre-shift Check List: (Warm Equipment for 10 min.)

___ Eng. Oil ___ amt. Added	___ Belts	___ Gauges	___ Grousers	___ Flashlight
___ Hyd. Oil ___ amt. Added	___ Tire Pressure	___ Wipers	___ Track Belts	___ Shovel
___ Radiator ___ amt. Added	___ Lights	___ Radio	___ Tire Guides	___ Cab Pin
___ Battery	___ Back-up Alarm	___ Battery	___ Track Tension	___ Fuel
	___ Fire Extinguisher	___ Tools	___ Emergency Brake	___ Lug nuts

Checked out by: _____

Shift End, Shut Down: (Idle for 10 minutes before shut off)

Fuel Amount: _____ Percentage of tanks used: _____ Water Separator Checked _____ Shoveled off _____
 Machine Parked _____ Implements down _____ Brake on _____ Plugged in _____ Key off Radio and Tele off _____

Average Gauge Readings: Engine RPM Setting _____
 Engine Temperature: _____ Oil Pressure: _____ Hydraulic Temperature: _____

Areas Worked (Trails Groomed)

Explain down time & any repair work needed:

MAP

Attach a map with each daily log showing the trails groomed that day. The map will provide the grooming coordinator and other operators with a better indication of where additional grooming may be needed.

1. The first part of the document is a list of names and addresses of the members of the committee.

APPENDIX F

SNOW TRACTOR SAFETY



MAKING SAFETY A ROUTINE PART OF TUCKER SNO-CAT®
OVERSHO W VEHICLE MAINTENANCE

There's one element of routine maintenance programs that's often overlooked: Safety.

Even the most common maintenance procedure can result in an accident if safe procedures aren't observed. That's why everyone involved in maintenance program - from operators to mechanics - should be required to learn and practice safe maintenance. If they don't, a PM program can quickly become a liability instead of an asset.

ROUTINE MAINTENANCE: YOU CAN'T BE TOO CAREFUL

1. KEEP YOUR EQUIPMENT CLEAN

Excess grease, dirt or oil can present a potential hazard when getting on or off a machine. Remove dirt, mud or grease from any steps, hand-holds or platforms.

2. PAY ATTENTION TO WARNING DECALS

"Danger" decals indicate a hazard that has a high probability of death or severe injury. Be familiar with the location of these danger points, and heed the warnings at all times. Also, keep warning decals clean, and replace them whenever they become worn or unreadable.

3. USE THE RIGHT TOOL FOR THE JOB

A large number of maintenance-related accidents happen because tools were in bad condition, not working properly or not exactly right for the job. Determine the tools you'll need before beginning a maintenance task, and have everything within easy reach.

4. DON'T DO MORE THAN YOU'VE BEEN TRAINED TO DO

Never attempt maintenance procedures that are beyond your level of experience; always ask for assistance, or delay service until a trained technician is available.

5. REMOVE IGNITION KEY

Accidental start-ups can be disastrous; always remove the ignition key to disable equipment prior to maintenance, cleaning or inspection.

6. VENTILATE

Carbon monoxide is a safety hazard as well as a health hazard;
(CONTINUED)



California-Nevada Snowmobile Association

always use blowers or fans to entilate the gas and fumes away from the workplace.

7. WEAR EYE PROTECTION

Eye hazards exist in virtually every maintenance application, and include flying particles, dust, fumes, mists, gases, vapors and liquids. Make sure the eye protection device matches the application; for example, chemical goggles should be worn when servicing a battery to protect from acid splashing and explosion.

8. ALWAYS LET THE ENGINE COOL OFF BEFORE ATTEMPTING SERVICE

In addition, when checking the coolant level, wait until the coolant temperature is below the boiling point to remove the pressure cap; loosen the cap only to the stop to relieve pressure before removing it completely.

9. USE COMPRESSED AIR AND PNEUMATIC TOOLS CAREFULLY

The main danger encountered in the use of pneumatic tools is getting hit by one of the tool's attachments; pneumatic tools should never be pointed toward anyone, and the user should never "dead end" the tool against himself or anyone else.

10. BATTERIES: SERVICE WITH CARE

Batteries can produce explosive gases that are easily ignited. Keep sparks, flames and cigarettes away from batteries at all times, and wear proper eye protection.

11. WEAR APPROPRIATE CLOTHING

Clothing that's too loose-fitting might get caught or hung up during maintenance procedures; wear the right protective apparel for the service application, keep shirt tails tucked in, and wear safety shoes or boots.

12. DON'T WEAR RINGS, WATCHES OR JEWELRY

Because of the restricted aspect of many service functions, jewelry and watches can easily get caught on engine components during maintenance; this increases the potential for personal injury enormously.

13. DON'T SMOKE

Aside from the obvious health hazards that come from smoking, cigarettes and matches should be kept far away from the oil and grease-soaked rags and other combustible gases and liquids that are a common part of equipment maintenance.

(CONTINUED)



14. KEEP A FIRST-AID KIT AND FIRE EXTINGUISHER NEARBY

It's important for all maintenance people to know where fire extinguishers and first-aid kits are located, and how to use them properly. These items should be inspected at regular intervals and refilled as necessary.

15. KEEP COMBUSTIBLE MATERIALS AT A SAFE DISTANCE

Never use alcohol, gasoline or other flammable liquids as cleaning agents. Make sure all flammable liquids are stored away from direct heat and in proper containers.

16. NEVER MAKE MAINTENANCE ADJUSTMENTS WHILE THE MACHINE'S RUNNING

Moving fan blades and fan belts are common causes of personal injury. In addition, anything that might fall into a moving fan (such as a screwdriver or wrench) can be thrown out with dangerous force.

17. PRACTICE MAINTENANCE HOUSEKEEPING

The neater a service and maintenance operation is, the safer it's going to be. Practice good housekeeping at all times. Properly dispose of old parts, rags and other objects. Keep tools clean, in proper working condition and stored in their proper place.

18. NEVER USE YOUR BARE HAND TO CHECK FOR HYDRAULIC LEAKS

Keep hands and body away from pinholes and nozzles that eject fluids under high pressure; escaping fluid can penetrate the skin, causing serious injury. Instead, use a piece of cardboard or paper to search for hydraulic leaks.

19. SECURELY SUPPORT RAISED EQUIPMENT WHEN WORKING UNDERNEATH IT

Whenever possible, lower equipment to the ground before working on it. If it's necessary to work under raised equipment, make sure it's properly supported. Use wheel chocks, and wear a hard hat and eye protection for additional safety.

20. USE HEARING PROTECTION

A number of maintenance procedures are noisy, and repeated exposure to excessive noise can result in permanent hearing loss. Wear hearing protection anytime service applications might expose you to potentially hazardous noise levels (80 db and above).

APPENDIX G

SNOW TRACTOR ABUSES

10 COMMON OPERATOR ABUSES OF A SNO-CAT**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 SNO-CAT and check the steering, hydraulics, brakes, etc., while the SNO-CAT is warming up.

2. FAILURE TO PERFORM WALK AROUND INSPECTION

There is no replacement for an operator's daily start-up inspection. No one should be more familiar with the machine than the operator. With the daily inspections, the operator has the opportunity to check for loose fittings, bolts, oil leaks, etc.

3. OPERATING A SNO-CAT IN NEED OR REPAIR

This is an extension of abuse #2. If something is found in need of repair, it should be repaired before operation. Otherwise, what might have been a minor repair could turn into a major expense and could also become hazardous to the next operator.

4. OPERATION WITHOUT PROPER TRAINING

Untrained operators, or even an experienced equipment operator who is unfamiliar with the SNO-CAT, can overload equipment causing stress and eventual damage. An important part of every operator's training should be to read and understand the operator's manual before any hands on training begins.

5. MISAPPLICATION

All too often, an operator will use a SNO-CAT to do a job it is not designed for, just because it is handy. An extreme example of such abuse is using the front blade to move large rocks and trees. Knowing the machines capabilities and its limits to the operator's advantage.

6. GOING TOO FAST

Some operator's confuse speed with driving safely. Practices such as operating a SNO-CAT too fast over rough terrain can damage tracks, drive train and cause excessive vibration. Also, working in too high a gear over works and over heats the transmission.

7. UNAUTHORIZED SNO-CAT MODIFICATIONS

Some operator's think such practices as resetting hydraulic pressures and recalibrating the fuel pump for more horse power, are acceptable. In reality, adjusting hydraulic pressure higher can stress the SNO-CAT beyond its limits and invalidate all warranties. Always check with the manufacturer before any modification is made.

8. HIGH TEMPERATURE SHUTDOWN

Not allowing the SNO-CAT temperature to stabilize before shutdown is hard on the engine and turbo charger (if so equipped). Allow the engine to idle a few minutes so the oils can circulate. Cool shutdowns will add life to the engine and is an excellent time to perform a walk around shutdown inspection.

9. UNFAMILIARITY WITH THE TERRAIN

An operator who is not familiar with the terrain can run into hidden dangers (rocks, trees, and steep side hills) that can damage the SNO-CAT and injure the operator.

10. USING ATTACHMENTS IMPROPERLY

Even if the front blade can do the job, take several cuts to remove that drift, saw that fallen tree up before pulling it out of the way.

ALWAYS FOLLOW THE MANUFACTURERS RECOMMENDATIONS

APPENDIX H
TIME TO WINTERIZE

TIME TO WINTERIZE

USE THIS CHECK LIST AS A GUIDE TO HELP YOU WEATHER THE MONTHS AHEAD

LUBRICATION

- _____ ENGINE OIL AND FILTER
- _____ LUBE FRAME, FIFTH WHEEL AND CARRIERS
- _____ TRANSMISSION OIL AND FILTERS
- _____ STEERING SYSTEM AND SUSPENSION
- _____ HYDRAULIC SYSTEM

COOLANT SYSTEM

- _____ CLEAN SYSTEM
- _____ PROPER MIXTURE ANTI-FREEZE, WATER
- _____ HOSES, CLAMPS, CAP, THERMOSTAT
- _____ PRESSURE TEST IS NECESSARY

STARTING AIDS

- _____ FUEL TANKS, LINE AND FILTERS
- _____ TRANSMISSION FLUID HEATER
- _____ COOLANT HEATER
- _____ ETHER INJECTOR

ADJUSTMENTS

- _____ TRACKS, WHEEL
- _____ TRACK ALIGNMENT
- _____ HYDRAULIC PRESSURE
- _____ BELTS, FAN AND PUMP

ELECTRICAL SYSTEM

- _____ BATTERY ELECTROLYTE LEVEL
- _____ CLEAN TERMINALS, CABLE ENDS, WIRING HARNESS
- _____ ADEQUATE GROUNDING TO FRAME AND CAB
- _____ CLEAN AND CHECK BATTERY BOX
- _____ STARTER MOTOR, ALTERNATOR, VOLTAGE REGULATOR
- _____ RADIOS-AM/FM, C.B.

CAB ACCESORIES

- _____ HEATER, DEFROSTER
- _____ CAB INSULATION, WEATHER STRIP
- _____ INSTRUMENTS, SWITCHES, DOME LIGHT
- _____ WINDOW FUNCTION, MIRRORS
- _____ NO BROKEN, DISCOLORED, CRACKED GLASS
- _____ DRIVING LIGHTS, ROTATING BEACON, SPOTLIGHT
- _____ WINDSHIELD WIPERS
- _____ BACKUP HORN AND LIGHTS

MISCELLANEOUS

- _____ DRIVER SURVIVAL KIT
- _____ FIRST-AID EQUIPMENT
- _____ EMERGENCY OILS, LUBE
- _____ TOOLS, TRACK JACK
- _____ ANY OTHER SPECIFIC NEED FOR YOUR OPERATION

APPENDIX I
SNOW TRACTOR SAFETY EQUIPMENT

