OPENING THE MT. ROSE CHUTES:
Transformation of a control program from road protection to skier protection

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ABSTRACT: The 200-acre avalanche prone area historically called The Chutes was open for the first time as part of the developed Mt. Rose ski resort on December 9th, 2004. This culminated 10 years of planning and marked the official change in emphasis of the control work performed in The Chutes from protection of Nevada State Route 431 to skier protection. The steps leading up to this opening included going through the NEPA process, developing a boundary management plan, and developing secondary control routes and alternative control methods. Since that opening date the procedures and control methods for operating The Chutes have continued to evolve over the course of the first four operational seasons at times as a reaction to significant events. Going forward future evolutions will be evaluated on the basis of their effect on worker and guest safety. In conclusion, the result of opening The Chutes terrain has been to provide the public with a challenging recreational opportunity previously unavailable at Mt. Rose.

KEYWORDS: History, The Chutes, control

1. INTRODUCTION

The Chutes refers to a 200 acre area that lies at 9,280’ on the north face of Slide Mountain, Nevada between what historically was the Mt. Rose ski area to the west and the Slide Mountain ski area to the east. They are located in the Carson Range near the north end of Lake Tahoe. They are bordered at the bottom by Nevada State Route 431 and the 431 Spur, also known as the Slide access road. The Chutes can be seen prominently from Reno on any clear day. The Chutes consist of a series of spines, gullies and narrow paths separated by rocks and trees that historically are frequent producers of avalanches. These avalanches can potentially cross SR 431 and the Slide Access Highway. In the winter of 2004-05 they were opened for the first time as part of a developed ski area, although chairlift access had been to the top of Slide Mountain at 9700’ since the 1950’s. The following paper will be a narrative of the layout and history of the area, the process followed to open the terrain and adaptations that have been made since the first season.

2. THE CHUTES

The Chutes sit on the east slope of the Sierra in the Carson Range. In the Tahoe area, Mt. Rose is considered a “high” elevation resort. The area tends to get shadowed out to some degree during all but the largest traditional storm fronts and usually gets 60-70 percent the precipitation that the Sierra Crest receives at a similar elevation. Our snowpack can often exhibit more intermountain than coastal tendencies and continental type snow-packs are not out of the question especially early season or in a drought year. Based on data from a snotel site at 8,850’ within the ski area boundary, an average winter means just less than 45 inches of snow water equivalent on the ground at the peak of the precipitation season and around 320” of annual snowfall. However it is not unusual to have a shallow snowpack develop in October and November in The Chutes due to their aspect and elevation when there is little or no snow elsewhere. This situation often results in naturally occurring climax avalanches the first time The Chutes are loaded.

Depending how you break up the area, there are 13-15 main avalanche paths with numerous other minor paths. Over half the paths are frequent producers of avalanches. Considerable fracture propagation is common especially along the western edge. Average run-out distance for all paths is over 650 vertical feet. The Chutes have an elevation range of 1,300 vertical feet. The highest point, called El Cap is at an elevation of 9,280’ and the road junction at the bottom is right around 7,950’. The primary starting zones range from 9,280’ to 8,700’. The
majority of the area has a due north aspect with the flanks and spines having some east or west component also. Do to the aspect and the steepness of the area, The Chutes stay in the shade in the winter with a few exceptions. Slope angles in the starting zones range from 35 to 50 degrees with the majority of the area being 37 to 42 degrees from the top through the middle of the runs. Approximately two thirds down the runs vertically, the pitch decreases to 25-35 degrees before flattening to a final out-run at a pitch of 10-20 degrees. The prevailing wind in our area is out of the southwest which results in The Chutes being cross and top loaded with some cornice formation in the top loaded areas most prominently along the western rim. Summer grooming of numerous runs in the early 90’s on the Mt. Rose side has resulted in less snow available for transport and less cornice formation than previously occurred. Below the ridge-top, the snow in The Chutes can be the least affected by the wind of anywhere on the mountain. Vegetative clues clearly reveal the areas where SR431 and the 431 spur are crossed in three spots by the historical slide paths.

3. HISTORY

The Mount Rose region has a long history when it comes to snow and snow sports. It was in the winter 1905 on Mt. Rose at elevation 10,776 just to the northwest of Slide Mountain that “The Father of Snow Surveying” Dr. Frank Church began recording snow and weather conditions for the National Weather Service. Church often said something that still holds true today, “Nature tells you things if you but question her and open your eyes”. He went on to develop the Mount Rose Snow Sampler and along with another Nevada professor the complex mathematical formula by which snowpack measurements are converted into water runoff forecasts.*

*McLaughlin (2006)
few surface lifts had been operating since the late 30's. From Tavern Sky devoted skiers hiked up to the 9,700' Peak of Slide Mountain and skied in the location of the present Mt. Rose - Ski Tahoe. In 1950, the old Mt. Rose Highway was just a summer road connecting Reno with beautiful Lake Tahoe but it improved every year allowing winter travel to higher elevations. The original Reno Ski Bowl was constructed on the east slope of Slide Mountain in 1953 and at one point was connected to the Sky Tavern area by the old Ringer Chair. Remnants of this lift can still be seen on the highway about 2 miles below the Mt. Rose main lodge where a lone, rusty lift tower remains standing. With the opening of Reno Ski Bowl, access could now be gained by chairlift to the top of Slide Mountain at 9700 feet in elevation. Through the 50's skiers would either ski Slide Bowl or The Backside which eventually becomes the Mount Rose Ski Area. For the most part The Chutes area was avoided because of the potential danger. Aside from any avalanche hazard, it was beyond most skiers' ability, taking into account the rudimentary equipment of the 1950's.

When Squaw Valley hosted the 1960 Winter Olympics, the Reno Ski Bowl was chosen as an alternate site for skiing events. Squaw didn't have adequate snow coverage. By the early 1960's ski equipment is evolving quickly with the pace of the sport and it's becoming more common to see or hear of skier's venturing into The Chutes. Around 1962 Reno Ski Bowl now Slide Mountain began offering a shuttle ride back to the Slide side from SR 431 and the area was as good as open for those who are willing. In 1965 Mt. Rose Development Corporation opened the Mt. Rose Ski Area on what was previously known as The Backside. In 1966 Mt. Rose installed the Northwest Passage chairlift that ascended the western rim of The Chutes. Skiers riding "NW" had an excellent view of this steep terrain as they were suspended over a part of the area as they rode past an off-set tower that was in the starting zones of one of The Chutes. With the increased exposure of the area, signs reading CLOSED – AVALANCHE AREA were posted on trees along the top rim. Ski patrol began periodic avalanche control with three purposes in mind; to protect the highway, to stabilize the area underneath the suspended part of the chairlift in case the need for emergency evacuation arose, and to protect skiers who inadvertently ventured into this closed but not roped area. It is important to note that from 1966 to 1986 control work was conducted by both the Slide Mountain Patrol and the Mt. Rose Patrol.

In 1969, during the course of a big winter, large artificially released avalanches buried a portion of SR431 and hit the Slide access road multiple times. A Forest Service Snow Ranger named Mac helped develop a more comprehensive avalanche control program and The Chutes obtained a rope closure in addition to the existing signage. The Slide Access road was now closed whenever the paths above it were controlled.

In 1970 and 1971 Mt. Rose Ski Area hosted the National Ski-Bob Championships. The course for these "ski-bikes" left the Mt. Rose side in the area where the Northwest chair rides over The Chutes. The contestants became airborne before landing in The Northwest chair rides over The Chutes where the remainder of the course was navigated. These events probably had the unintended effect of removing some of the "taboo" associated with this steep terrain and it was not uncommon to see competent skiers venturing beyond the ropes.

January 29th 1972 dawned clear and windy after a four day storm brought over 2 feet of new, wind deposited snow. At around 3pm, seven young men, mostly teenagers, were in the area of the old Northwest tower 9. Three boys are in The Chutes and four are standing on the cornice above them. As one of the three made a few turns, the slope released beneath the skis of the group on the cornice. All seven were caught. The initial slide triggered a larger avalanche on the adjacent slope to the south. The deposition was 20 feet deep where the two slides overlap. Witnessed from the chair, the patrol was on scene initiating a rescue within 10 minutes for the three boys that were completely buried. Rhys Wilson 23, buried head down, survives a 6 foot, 30 minute burial when rescuers dug below his ski pole and found his hand still holding the handle at 3 feet. Steve Brown 16, and Richard Lyon, 15, are not so lucky. They were found within an hour of Rhys Wilson's rescue. Close to a hundred people assisted in the rescue. A full account of this accident is documented as No. 72-7 in Snowy Torrents.

Partly as a result of the 1972 fatalities, Washoe County Ordinance #412 was passed in 1978 that prohibited trespass in a closed area. Violators to this day can be punished with up to a $500 fine and/or 6 months in prison. The passage of this bill gave “teeth” to The Chutes closure and decreases were seen in the number of violators. The local skiers still entering The
Chutes generally did so more discretely as the ski patrol tightened enforcement of the closure. 1983 was a big winter and patrol was not yet practicing a consistent protocol for initiating explosive control measures in The Chutes. Due to economic constraints, patrol did not always perform control work when the ski areas and highway were closed, occasionally leading to very large slides when the routes were finally performed. After a heavy snowfall accumulated during a three-day storm closure, patrol triggered a large avalanche in the Yellowjacket chute that sent debris across SR431 partially burying a Jeep. This inadvertent “build-up” during closed periods also sent avalanche debris across the Slide Access Road a couple of times from the Nightmare path. In 1985 storm accumulations during a ski-area closed period lead to a close call with SR431. The protocol for when to initiate control measures changed to a more conservative approach. Now one foot of snow from precipitation or wind loading was enough to do control work regardless of area or highway closures.

The Iron Curtain between Slide and Rose finally comes down in 1987 when Mt. Rose Development Co. acquired the Slide Mountain Ski Area terrain under a lease agreement with the U.S. Forest Service. With there now only one ski operation on Slide Mountain, The Mt. Rose Ski Patrol was solely responsible for control work in The Chutes. This results in a greater degree of consistency and frequency in the manner control work was conducted. Around this time the signage along The Chutes rim was changed to AVALANCHE AREA-DO NOT ENTER. Over the course of the next ten years, routine avalanche control measures effectively decreased average avalanche sizes by increasing their frequency. Consequently average run-out distances also decreased considerably. Numerous violations of The Chutes closure occurred annually with only a hand full of the skiers being apprehended. During this time the ski industry adapted to skier demand by including steeper, more “extreme” terrain in their expansions. The local skiing public began to vocalize their desire to have The Chutes open.

4. THE ROAD TO OPENING

From the early seventies to the mid nineties, the control work performed in The Chutes consisted of two 15-20 shot-point routes: Red route on the ridge bordering Slide Mountain Ski Area and Green route along the ridge bordering the Mt. Rose Ski Area. The existing Slide Mountain Special Use Permit included 18 acres along the eastern rim including the majority of the Slide route starting zones and Mt. Rose starting zones were on private property. An informal agreement with The Nevada Department of Transportation, inclusion of a control plan with the USFS Winter Site Operation Plan and the need to get the public to the ski areas were the three factors that had allowed control work to be conducted in The Chutes for close to thirty years.

In the mid-nineties a pivotal moment occurred in the history of The Chutes when ownership began to consider the possibility of trying to open the area as part of the developed ski area. Up to that time it never been actively pursued. Unfortunately, in 1993, the 131 acres of The Chutes that was not Mt. Rose property or included in the existing SUP for Slide Mountain changed from private property to Forest Service property as a result of the 1993 Galena land exchange. Given the resource and the desire, those 131 acres probably could have been purchased for a good price and development of The Chutes could have begun. By 1997, Mt. Rose was in the midst of trying to do a land swap themselves. Preliminary plans were developed to try and have The Chutes open by the winter of 1999-20000. Due to a number of factors this attempt failed right when it looked like it was going to succeed. In the mean time the number of “poachers” is at an all time high. Patrol reduced the threshold to 6” of new snow/deposition and increased the frequency and degree of avalanche control. Bumper stickers that say “Open The Chutes” and “Ski The Chutes” are seen around town and a local sports store produces sweatshirts with “Open The Chutes” emblazoned on the back.

Shortly after the failed land exchange, Mt. Rose began discussions with Gary Schiff the new district ranger of the Humbolt-Toiyabe National Forest, of which Slide Mountain is a part, regarding the steps that would need to be taken to secure a permit for The Chutes. Having just the one ski area in the district and a lack of expertise in ski area development in his office, Mr. Schiff looked for some guidance and assistance from outside his district. He contacted Tom Contreras with the USFS Intermountain region who worked with the Utah resorts to come and give his analysis of our situation and what he thought could be done. Mr. Contreras proved to be an important cog in the wheel that would
eventually result in The Chutes opening. He laid out the steps to initiate the process and offered his support in arranging to have the appropriate USFS personnel involved. Mt. Rose would first have to develop a Facilities Improvements Proposal whose proposed actions would then be analyzed under the National Environmental Policy Act of 1969 (NEPA).

Mt. Rose hired the SE Group to aid in the development of the Facilities Improvement Proposal and to be the third-party contractor in facilitating the NEPA process. In January of 2001 Mt. Rose submitted the proposal to the Forest Service including all the projects it felt may be done in the following 7-10 years at the resort. One of the main purposes behind the proposed action was to diversify the skiing terrain and amenities offered, meeting the demands and preferences of the recreating public. A Forest Service Interdisciplinary Team headed by Art Bauer of the Aspen Ranger District determined that completion of an environmental assessment would fulfill the requirements of NEPA by analyzing the potential site-specific and cumulative effects likely to result from implementation of the proposed actions. The proposed actions in The Chutes included incorporating the 131 acres into the existing SUP, construction of an access lift back to the Mt. Rose side, construction of a return ski way from the Slide side to the access lift and selective glading to improve the skiing experience especially on the bottom third of the area where frequent control work had resulted in considerable tree growth in the previous deposition zones. The environmental analysis began.

Concurrently to the NEPA process, management and more detailed control plans for The Chutes were developed. The Chutes would be accessed through a system of gates. Gate locations were determined to allow for ease of access into The Chutes for patrol and guests. Some exploratory secondary routes were conducted and a plan was made to install an avalauncher to provide mid-slope protection. Without the benefit of skier compaction, much of the work was speculative but allowed the patrol to become more familiar with the area. Although control work had been conducted for over thirty years all but a small amount of it was from the ridge-top so there was very little data regarding the mid-slope hazard in The Chutes. By the start of the winter of 2002-2003 there was optimism that The Chutes portion of the Facilities Improvements Proposal would withstand the scrutiny of the NEPA process. Patrol was instructed to use the next two seasons to prepare for opening The Chutes during the 2004-2005 season.

The 02-03 season started early with a more than three foot dump the first week of November. By December 12th there is 30-36" of faceted snow sitting in the Chutes when the second storm cycle of the season arrived. On the evening of the 13th the snow level rose to above 9,000". By midday of the 14th the temperature dropped, the wind picked up and the snow intensified. A record gust of 82 miles an hour was recorded at the Reno airport. The morning of the 15th dawned with over a foot of new snow overnight and two feet for the storm with wind forecast all day and snow returning in the evening. The Slide side was not open for the season due to a lack of snow and the Northwest chairlift is on a wind closure. A minimum of control work was performed with plans for full routes the morning of the 16th. At around 2:30pm, 3 snowboarders, one a current mountain employee, went under a closure at the top of the open Lakeview chairlift and hiked up a traverse to the top of The Chutes where they went under a second line. After riding down part of Slide Mountain, they jumped into the Hornet’s Nest chute and triggered an avalanche. Clint Sappenfield, 26, was buried in a Class 2 soft slab avalanche with a crown of 12-16" that ran 600 vertical feet and released on a glazed crust. His two companions made their way to SR431 and flagged down a Nevada Department of Transportation plow driver who transported them to the Rose lodge and notified the patrol. With limited manpower, snow starting to fall, and hazard increasing, patrol initiated a rescue. At the height of the rescue effort, seven people and two rescue dogs searched. After four hours as the group was halting rescue efforts due to the increasing hazard, a rescue dog located Mr. Sappenfield three feet under the snow in a cluster of small saplings. There were lots of lessons learned.

The weather kept the ski area closed the following day. As Patrol personnel arrived for work there was some ominous convective activity. This along with a raging snowstorm and the events of the day before limited the amount of control work that was performed. By midday SR431 was closed and snowfall intensified. Despite the weather clearing overnight, the road...
was still closed the following morning when we pulled up to the NDOT closure for clearance to continue up to the ski area. Annually Mt. Rose supplies NDOT with a list of authorized personnel that the ski area would like to be able to reach the resort during road closures to ensure that avalanche control can be performed. If needed, NDOT will escort or transport personnel to the resort. Mt. Rose provides NDOT a mountain radio to ensure good communication during control mornings. The NDOT/Mt. Rose relationship was finally formalized in the fall of 2002 when an official MOU was signed.

The hazard rating was extreme for December 17th given the advanced facets at the ground and the presence of the ice crust. A single “test shot” was thrown in the top of El Cap releasing a Class IV avalanche that encompassed the entire western edge of The Chutes with crowns from 4-10’ deep. The five paths to the east released sympathetically moments later. The resulting collision slowed and redirected the debris preventing the slide from crossing the highway. When it was over, one hand charge had climaxed avalanched 11 paths and the debris came within 50 meters of the highway. At least three towers of the proposed Chutes return lift would have been hit if not destroyed by this avalanche. Subsequent snow storms stabilize in The Chutes and patrol is able to continue with familiarization of the terrain the rest of that season. Exploratory secondary hand-charge routes were conducted 8 times. By the start of 2004 110” of snowfall has been recorded in December and patrol triggered 7 Class III avalanches in a period of three days spanning the New Year. A relatively quite couple of months followed allowing the patrol to spend needed time in the area. In addition, over the course of the last half of the season groups of employees and some pass holders were allowed to experience The Chutes, after control work and/or hazard evaluation, through the gate sites with a patrol escort. They were then allowed to go wherever they could from the designated access point. We typically were able to do 4 or 5 runs, each through a different gate location with a shuttle bus before we opened the mountain for the day. These “dry” runs were beneficial to see some of the dynamics that would occur when we opened The Chutes. As the season drew to a close, a variety of new equipment for everything from patient extrication to avalanche rescue was ordered. When patrol removed the AVALANCHE AREA-DO NOT ENTER signs and replaced them with bright yellow AVALANCHE AREA-ENTER THROUGH GATES ONLY, the end of an era was reached.

In January of 2003 the Facilities Improvement Proposal had gone through the environmental assessment to satisfy NEPA. The main comments regarding The Chutes concerned visual impacts of the proposed chairlift, the proposed ski way and the proposed tree cutting in the area. A sensitive plant species, the Tahoe draba, a member of the mustard family, was identified and had a major impact on portions of the Facilities Improvement Proposal for Slide but a minimal effect on The Chutes expansion. The visual issues surrounding The Chutes chairlift results in the chair changing alignment and now going to the Slide side instead of the Mt. Rose side. Lift manufacturers were contacted and a deal was made to install a new CTEC high speed six-pack on the Slide side and to move the existing CTEC quad fixed grip chair into the Chutes. Plans were made and work started in the summer of 03 to include cutting the chair line, prescriptive glading, installing an avalauncher and installing The Chutes entry gates.

In the spring of 03, a B-2000 breech loading avalauncher was ordered from The Launcher Co. The goals behind installing the avalauncher included providing mid-slope protection for secondary control routes and the ability to blind fire and do some control in the event the ridge top was inaccessible. Possible targets would be limited by the risk of over shooting into Slide Bowl. A fully enclosed steel mount with a drop down front wall was constructed and installed with a clear field of view at the middle section of The Chutes. Pete Peters with Avalanche Control Systems came up in September and we test fired thirty assorted inert rounds. This was invaluable in allowing us to develop some familiarization with the tool and to acquire some target data prior to using live rounds. An operations plan and philosophy of use were developed.

In the winter of 03-04 Mt. Rose received 270” of snowfall and 37” of SWE by the end of the season. A below-average winter but it had come steady and strong from the 1st of December and skiing was good in The Chutes by Christmas. Control work was performed 23 times with 189 avalanches, mostly Class I and Class II. Ten Avalauncher missions were conducted representing over 100 rounds providing some needed experience.
5. THE FIRST SEASON (04/05)

Lift construction got off to a quick start but it wasn’t long before the fall colors started to show that the lift towers were flown into The Chutes. Steel The Chutes cut-out signs, gate name signs, degree of difficulty signs, and closed signs were mounted on the 8 gates. Individual trail signs were mounted on trees along the top of The Chutes. Descriptions of the terrain, hazards and operation plan were included on the areas’ website, literature and pass holder information. The Chutes, when open, would close at 3:30pm to allow the area to be cleared before closing the rest of the mountain at 4 pm. The word was spread that pass holder caught violating a closure in The Chutes would lose their pass privileges for three seasons and the sheriff might be called.

By the third week of October we were still waiting to have the chairlifts load tested and it snowed three feet. This snow allowed our Dave Haul the grooming manager to begin trying to groom the loading area of the Chuter chair and the catch runs that we would need in the bottom of the run-out to funnel skier’s to the lift. He immediately recognized we had a problem with three rock outcroppings that would make grooming difficult until we had a considerable amount of snow. Fortunately we were able to get approval from the USFS and get a permit from NDOT to close the highway for a period of time one evening and within a week the rocks were blasted and laid over solving the problem. By start of December the new chairlifts were ready, the Rose side has been open for a while and all we need is more snow. The plan for control work was to do the ridge-routes and then clear the mid-slope areas with the avalauncher and secondary routes.

A storm cycle on December 6th and 7th brought enough precipitation to open the Slide side and consider opening part of The Chutes. The Chutes can never be opened without the Slide side open given the lift configuration and a similar minimum threshold of snow. When control work is performed on the 8th a large section of the middle of The Chutes releases on facets at the ground and is rendered un-skiable. Secondary routes are performed in the areas that did not release with minimal results. The remainder of the secondary work was performed the morning of the 9th and about half The Chutes area was open for the first time as part of the ski area at 1pm.

The morning of the 10th The Chute area was manually assessed and the gates that could be were opened. At around 11 am, there were two post-control releases on opposite sides of The Chutes within 15 minutes of each other that were attributed to a rapid rise in temperature. Nobody was buried just a little shook up. However, The Chutes were closed and both avalanches were cleared with probe lines and rescue dogs. This was quiet a wake-up call and not exactly a smooth start. More hazard evaluation and control work was performed on the 11th and a portion of The Chutes were re-opened.

Just before Christmas, Tom Carter from Ruby Mountain Heli-Ski was hired to put all the patrol staff through an AIARE Level 1 and Level 2 class. Many of us had attended the National Avalanche School and some sort of field session before but to go through these classes together with an incredible educator was good for the team. From December 28th to January 11th, 2005 two storm fronts brought over 20” of water and 100” of snowfall. We were able to get The Chutes open early in the period and were able to ski through most of the event. When the skies cleared everything in The Chutes was filled in and formerly tight spots were thoroughfares. Skiing was more than incredible. The intensity and dedication of the patrol and the gratification of the public during this historic period was overwhelming to me. The Chutes were a viable part of our operation.

The Chutes had been open for 128 days by the end of the season. We received 340” of snowfall and 50” of SWE by the end. Control work was conducted 27 times, resulting in over 300 avalanches the majority of which were Class II. Averages of 80 hand charges are used on a full control day which is double the amount from before The Chutes opened. The avalauncher was fired seven times. The benefits of skier compaction to hazard reduction were obvious. A total of only 28 injured guests were transported and treated out of The Chutes by patrol out of over a thousand total documented accidents.

6. THE SECOND SEASON (05/06)

Operationally the one change we made after the first season was that we would not open any gates until the whole area was ready and when practical we would open all the gates at the same time. The first season there were instances when we would have part of the area open and would be doing control work in a
different area and public would duck the rope above us.

It would have been hard to script a more perfect weather scenario for the second season of The Chutes. We received over 20" of water and 123" of snowfall in December and by the first of the year there was a strong Sierra snow-pack in The Chutes. Snow was plastered on everything and there was not an un-skiable line anywhere in The Chutes. When placing an explosives order in January of 06, we were informed that our normal supplier would no longer have avalauncher rounds available. Consequently the avalauncher was used early in the season but not used at all the rest of the season. For the most part control work this season was all done from the ground. It would not be until near the end of the season that we find another supplier and have Avalauncher rounds back on hand.

The Chutes had been open 115 days by the end of the season. We received 415" of snowfall and had 65" of SWE by closing. Control work was conducted 39 times with over 400 resulting avalanches. For an above average winter, things had gone very smoothly considering it was only our second year in operation.

7. THE THIRD SEASON (06/07)

The winter of 06/07 started slow and never really got going. When control work was first performed on January 5th, numerous avalanches released low in the starting zones below the shot holes, foreshadowing what would occur the rest of the winter. By the beginning of February 07 there was less than 8" of SWE and depth hoar had formed on the ground and there was an ice crust mid-pack. The Chutes had not opened. The first sizeable storm of the season concluded on the night of the 10th. On the 11th Green and Red routes are controlled with a Class III release in Green and minimal results along Red. On the morning of the 12th two patrollers are doing mid-slope control work in center of The Chutes. They had thrown a number of explosives with results and have put four shots in the last chute they need to control. In the process of ski cutting the slope released over 100' above one of them and he was swept away on a 3' slab. A rescue ensued. When the dust settled the patroller has a skull fracture and a broken leg but is alive. It will take him 9 months to recover. The Forest Service was notified and an experienced off-duty patroller was called in to conduct an investigation and file the appropriate paperwork with the USFS. Bob Moore and Ed DeCarlo with the USFS came up to inspect the scene and to assure a comprehensive report was filed. A detailed Avalanche Incident Report was submitted to the CAIC a few days later.

About a week after the accident, a shift occurred in the thought process of the patrol from what if to what now? A stress debriefing was held. The focus was on what could be done to prevent an accident of this type in the future and how the rescue played out. On the rescue side, a need to make all transceivers used by the patrol the same model was identified. 35 transceivers of the same brand were ordered for the next season. On the hazard evaluation side, a need for a dedicated avalanche forecast person was identified. Due to a variety of reasons this position had been by committee the past ten years although the need had been previously identified. Plans were made to hire a forecaster prior to the next season. On the control side, a need to find an effective delivery method of large explosives into the mid-slope areas when advanced faceting or persistent weak layers are present was identified. I had seen a demonstration of The Avalanche Pipe, a member of the Avalanche guard family, at the previous two ISSWs at Telluride and Jackson Hole and I felt it might be a tool we could use in The Chutes. I contacted Dave Sly with Maple Leaf Powder Co. and Larry Heywood with Outdoor Engineering because I knew both of them was involved with this product to some degree. It turned out Larry had a demo and he was willing to bring it over and let us try it out. When Larry delivered The Pipe, the shop at the ski area fabricated a mount for one of the snow-cats. Through Dave Sly we were able to arrange to have the explosives and propellant cups delivered to Mt. Rose within a couple of weeks. Our snowpack continued to rot.

While preparations were made for the Pipe, we received what would be the largest storm of the season the last few days of February and when control was performed on the 27th and 28th a number of scary mid-slope avalanches were triggered. On the 27th a Class IV avalanche was released burying a portion of the Slide access road. These slides further served notice to us that we needed an alternative method of control when facing this type of snowpack.

By the 7th of March things were in place and Dave Sly came down from Canada to test fire The Avalanche Pipe. The goal of the test was to establish whether the pipe had the range
to put its’ large payload into the middle of The Chutes when shot from the ridge-top. The test was a success and a proposal was developed to implement this tool at Mt. Rose. A few days later Doug Abromeit with the USFS National Avalanche Center and Bob Moore from the Truckee Ranger District visited Mt. Rose and a presentation of the history of control work in The Chutes and our plan going forward was given. They endorsed our plans going forward. One additional live test firing was conducted after the ski area closed.

One complete Avalanche Pipe and three additional bases were ordered from Larry Heywood and Outdoor Engineering. Three fixed mounts for the bases were constructed and installed the following summer on The Chutes ridge-top. The fourth base was mounted on a snow-cat. The plan for this tool was to move the head from base to base when firing. The goal behind the program is to increase worker safety during times of uncertainty in The Chutes. It will be used the first time the terrain is open for the season and during big storm cycles when we are unable to benefit from skier compaction. Individual winters will determine the extent to which the Avalanche Pipe system will be used.

The Chutes were only open for 11 days during the winter of 06/07. It was amazing they were open at all. Mt. Rose received 190” of snow fall and had only 20” of SWE on the ground at the peak. Control work was only performed 13 times resulting in 82 avalanches. The avalauncher was fired six times for a total of 70 rounds and a few avalanches were triggered. There were only three injuries in The Chutes.

8. LAST SEASON (07/08)

By the fall of 07 the Avalanche Pipe mounts were in place and an initial test firing with inert rounds provided some baseline data for operations. The plan would be to fire up to four of the 4kg guard rounds from each of the three fixed mounts, spreading the explosives across the major starting zones. The pipe system would be used in conjunction with the avalauncher, the historical ridge-top hand charge routes, and the seven secondary routes that had been developed. Dallas Glass, an avid backcountry skier with a Masters in Hydrology took the roll of Avalanche Forecaster and began developing his knowledge of The Chutes and coordinating the efforts of the patrol in daily hazard evaluation and forecasting.

On January 7th enough snow had accumulated that The Chutes are close to opening. The ridge-top routes were shot with minimal results. A total of seven guard rounds were fired from two of the mounts releasing one Class II slide. Secondary routes also have minimal results and by early afternoon Patrol are ready to open The Chutes. For a variety of reasons the terrain does not open for two more days. January and February brought most of the season snowfall. With no storm total over 20” after the initial opening of The Chutes, control work is primarily with hand charges the remainder of the season. For the first time The Chutes were periodically closed in April due to a strong melt/freeze cycle and the potential for wet slides.

The Chutes were open for 93 days in 07/08. Mt. Rose received 250” of snowfall and had 32” of SWE on the ground at the peak of winter. Control work was performed 19 times resulting in 252 avalanches, 8 of which were Class III. This season was a good test of our ability to rebound from adversity and it was rewarding to have a successful season following the previous season.

9. CONCLUSION

There is no question The Chutes terrain will continue to have avalanches and people may be caught. Given the layout of the area and the advances in snow sports, however, The Chutes needed to be open. The situation prior to opening The Chutes had reached a point where accidents were going to happen because people were disregarding hazardous situations on a regular basis. This incredible chunk of terrain with two lift to the top of it was staring people in the face and it needed to be managed for more than road protection. More avalanche control has been performed in The Chutes the last five years than in the twenty years before. The methods that are used to control The Chutes will continue to evolve as patrol gains experience through the years. We are just entering our 5th season while many of the Class A areas that have Chutes type terrain in North America have over forty years of operational avalanche control experience and history. We have demonstrated resiliency and a desire to improve our work product. Our philosophy will be to evaluate all change and innovation based on how they will affect worker and guest safety. Our skiing public can now choose to enter The Chutes and experience a thrilling recreational opportunity that
rivals anything in North America. We have given the people what they wanted. Reno has always referred to itself as “the biggest little city in the world” and The Chutes could just be the biggest little 200 acres in North America.