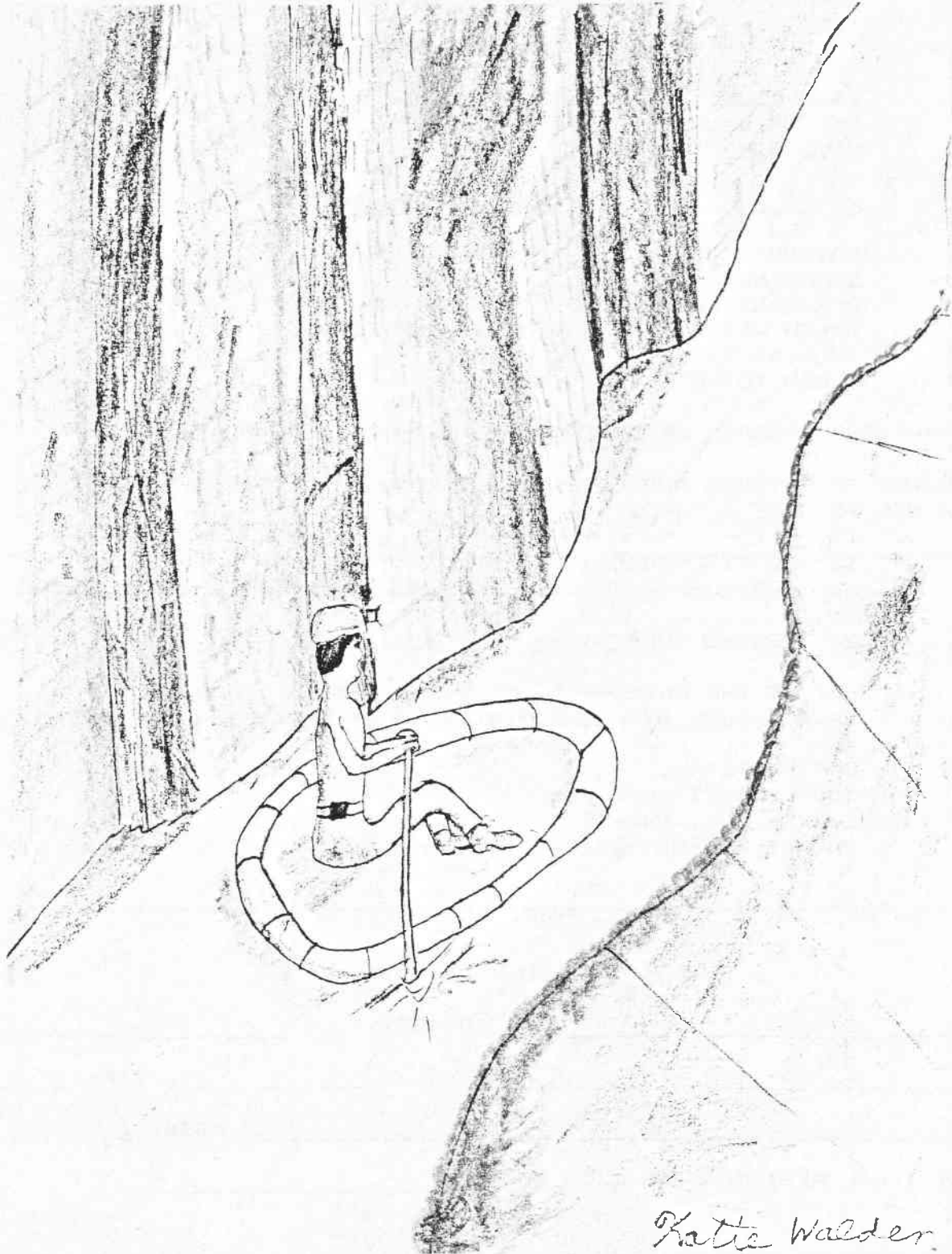


COG SQUEAKS



COG SQUEAKS

COG SQUEAKS Grotto Information

The Central Ohio Grotto meets the second Friday of each month or the Saturday following the second Friday at 8:00 PM. Meeting notices are published in the Squeaks, the Grotto newsletter. Please call any officer for meeting information or caving trips.

COG officers are:

Don Conover	Chairman	513-372-7581
Bill Walden	Vice Chairman	614-965-2942
Bruce Warthman	Secretary	614-459-5854
Karen Walden	Treasurer	614-965-2942
Chuck Daehnke	Ex. Committee	614-263-7011
Mike Gray	Ex. Committee	513-276-2436
Jake Elberfeld	Ex. Committee	513-644-5848
Bill Walden	Squeaks Editor	614-965-2942
Paul Unger	Boone Karst	513-839-4258

The official grotto address is:

Central Ohio Grotto
C/O Bill Walden
1672 South Galena Road
Galena, Ohio 43021
614-965-2942

The official newsletter of the Central Ohio Grotto is the COG Squeaks. Subscription is \$10 per year. The COG Squeaks is published 10 times each year. Articles may be reprinted by other NSS member organizations provided that the author and COG Squeaks are given credit. Please contact Bill Walden regarding the COG Squeaks. Articles, poetry, fiction, and information related to cave exploration and study are welcome. Articles may be submitted on disk. I can read IMB PC-DOS or OS-9 DOS (any convention).

For membership information please contact Bill Walden.

MEETING NOTICE

SEPTEMBER 1989

The September meeting will be hosted by Andy Franklin and Kathy Welling at their home in Dublin, Ohio **FRIDAY SEPTEMBER 8, 1989 at 8:00 PM**. Non-COG members interested in

caving, cave conservation, or caves are invited to attend.

Andy and Kathy's address is:

6737 Welland
Dublin, Ohio 43017
Phone: 614-766-6381

(ANDY NOW LIVES IN THE COLUMBUS AREA)

HISTORICAL SUPPLEMENT

This issue of the Squeaks has a section on Saltpetre. Many COGer's have encountered Saltpetre works in Kentucky and Tennessee caves. Most of us are aware that Saltpetre mining was in support of the Civil War or the War of 1812; but, I suspect not many of us are familiar with the process of extracting Saltpetre from the cave earth. Detailed instructions are in this issue. I hope you enjoy this special historical supplement. -- Bill Walden, editor COG SQUEAKS

The Society of Honorable Indiana Troglodytes "Hoot"

June 10-11, 1989

by
Andy Franklin

Kathy Welling had invited me to participate in the annual "Hoot" hosted by the Society of Honorable Indiana Troglodytes (you figure out the acronym!). Being an Honorable former Hoosier (or is that a formerly honorable Hoosier?), I accepted.

The Hoot has two functions. The primary one (I think) is an orienteering contest. The other one has to do with this very large pot of beans that gets cooked. (Are you listening Chuck?). The orienteering course gets set by the prior year's winning team, and our goal was to bring the trophy to Ohio (the 'Kiwi Fruit' theory). By the way, the trophy for placing in this thing is the south end of the proverbial northbound horse.

The basics of the contest are that each team is given 15 minutes to look at a topo map with the targets marked. These targets are usually flagging tape with a pen

attached. You then go out into the wilderness to find them, being careful not to be led astray by decoys and other traps. The winner is determined by the number of stations found, with similar counts ordered by time. This group is good enough that you need to find all the stations in order to place.

This year's course was interesting. The contest was held at a state park near French Lick. One station was in a cave, and two were in the middle of the lake! This was not for the faint-hearted, although you could walk to those in the water - about chest deep.

We flew through the first 2/3's of the course. We then really struggled in the 10' tall raspberry patch to find a station. Alas, fatigue finally set in and we failed to find a station that had a calculated position. This miscue dropped us to fourth place. However, now that I know what I am doing, we will bring the win home next year!

**1989 NSS Convention
Sewanee, Tennessee
July 30 - August 5,
1989**

OR
Andy Gets A Vacation
by
Andy Franklin

Kathy Welling and Mike Gray managed to convince me to go to Convention this year. I think it was along the lines of 'Gee, Andy, getting away will do you some good'. So, they got me to close the office for a 'holiday' and away we went.

We finally escaped Columbus around 5 PM Saturday to start the 7 hour drive to southern Tennessee. Not bad for shooting for 10:30 AM! I think leaving the office at 1 AM the night before may have played a part. The drive down was generally uneventful, and we arrive at registration at 2 AM and found the Walden campsite about one hour later. It, of course, was out in BumDum NoWhere.

Mike and Gloria (Gray) showed up Sunday morning and we set about removing the thorns, stick, roots, and other assorted

sharp object from the site. About the time we got done the critical mass of cavers was achieved and it started to rain. We received just over an inch of rain in the next 45 minutes, most of which I think went in Gloria's tent. The dirt trail back to the camping area soon became impassable to even 4x4s.

The Howdy Party on Monday was, quite frankly, a bust. The band was from the Jack Daniels Distillery, and, while they make a superb whiskey, they do not make a good band, particularly to a group looking to boogie.

The non-caving highlight of the week for me was finding myself teaching the 'Intro to Surveying' course. I had planned on attending this workshop to learn all the things I did not know. Unfortunately, for whatever reason, there was no instructor. Three of us taught the class as a rather successful forum. I later received several requests for hands-on work (which we were not prepared to do) so I held another practical session later in the week. This included surveying up some tight spiral staircases! Kathy, being an officer in the NSS, was tied up doing governing-type things most of the week.

I got to go caving twice. And for being a climber in TAG country, both were reasonably horizontal. On Wednesday Kathy and I went on an organized trip to Pumphouse Cave. This cave was featured in the July '89 NSS News. I still have to read the article to see what the cave was about. Our group (about 7) brought the number of people to have ever been in the cave to 20. This cave was described as medium difficulty, some wet, and horizontal. I have never been in a cave where we spent so much time climbing on extremely unstable breakdown with 'significant' exposure. My nerves were glad to be out of that system.

On Friday, while Kathy was off playing BOG, Mike, Gloria, Chuck, Bill, Katie, Larry Fisher, and myself went to Sinking Cove Cave. We were going to do a two mile horizontal through trip. We parked at the exit, and walked over the mountain to the other entrance. It was a great walk.

This cave is very wet, and we spent considerable time wading in knee deep water.

The route we took was a large bore hole, and we covered to two miles of passage in just over two hours. The primary feature of the cave was the size of the passages, although there was a stretch of curtains and the like. There was quite a bit of traffic in the cave and we were told to use the last exit. What we were not told was that the water was at least 8 feet deep at that point. Katie learned how hard it was to swim in boots and needed to be pulled out. After the walk to the cave in the heat it was very refreshing.

I did not decide to go to convention until the middle of July, and I want to thank Mike and Kathy for talking me into going. A good time was had by all.

**DoubleHead Cave
The Project Resumes
August 19, 1989**
by
Andy Franklin

I have always been uneasy that Mike and I left DoubleHead hanging when we hit burnout at Y2. While at Convention, I decided to revive the project in order to complete it and bring it to closure.

Kathy, Jay Kessel, Barry Welling, and myself started the resurvey. Although there was some rearrangement of the entrance, the cave was basically unchanged since my last visit six years ago. I was somewhat suprised at this since I expcted some washing from the flood a few years back. But we could even find most of the old survey stations.

Bear and I had a unique experience when we went into the cave to make sure that the entrace was still passable. As I was leaving, a skunk entered. After some discussion, we decided to enter the cave as a group anyway.

We surveyed about 650' before some members got too cold to continue. While this is not yet close to where the original surve left off, I think it is valuable to establish a new baseline in the cave. Bear was able to find several promising leads that were unknown until now. The next several trips will concentrate on the baseline back to Y2, which is either the

terminus or the junction to the main Dry Valley trunk.

**The Pumpkin Papers
August 20, 1989**

Kathy, Jay, Bear, and myself stopped at Pumpkin to see how the Spring Entrance was faring. Bear had heard us talk about the dig, and was curious to see what we had done.

Basically, the route we have been trying to keep open is continually clogged. We have been working under the assumption that the water has been flowing downhill through a sump into the cave. The cave has swallowed over 3500 cubic feet of gravel in the past year, and we are somewhat stumped as to where the rocks are going.

Unfortunately, the route back to the sump is filling with large rocks (4-6" in diameter). These are washed in from the surface. To make matters worse, the pool at the sump has crayfish in it, which suggessts permanency. However, Kathy pointed out that there were sticks in the ceiling channel. After some quick removal we uncovered a new passage essentially where you would expect the 'old' channel to be. Bear was able to squeeze up into the crawlway and found it opened up to a comfortable hands and knees. Since we were only with flashlights and shorts, Bear stopped at a bathtub that was more than arm deep.

We then were able to dig open the high route back to the original dig site. This will make it possible to easily get to the new section.

I think the next step is to survey back into these areas with extremely accurate vertical control, perhaps even as far as using a water level. We know that the cave will run full at the entrance, and I want to know what areas of the cave are above the ceiling there. We have been thinking that the water has been flowing out the 'sump', but I think now that it is possible that the cave, under flood, is backing up and the bulk of the water is going up and over.

There will be a weekend of surveying in DoubleHead and Pumpkin on September 16-17. We are trying to establish a standing trip

on the third weekend of the month. For information call Andy Franklin or Kathy Welling at (614) 766-6381 evenings or (513) 767-2279 days.

SPELEO-OLYMPICS

by
Katie Walden

I thought that the speleo-olympics were fun but some people were disappointed because there wasn't any mud and you only went into the lake once.

Hard hats and boots were suggested, but I don't know why. Some people went bare footed.

You started behind a tree root and ran about 20 feet to a bridge. The bridge was mostly holes. There were five 2 by 4's connecting two other 2 by 4's. There was about 2 feet in between each 2 by 4. You had to go across the bridge and back. Then you ran about 60 feet and up some boards. After that you went across a rope and back. Then you went back down the boards.

After that you played "leapfrog" jumping from one piece of wood to another. Then you did a belley crawl.

After you ran about 20 feet, you ran down some more boards one of which was in the lake. Then you read the back of a board sticking up in the lake. After that you ran back up the boards. After about 20 more feet of runing, you went across the bridge and back again. And, finally you went back across the tree root.

I ran the course 6 times. My best time was 1:20 and my second best was 1:22. I managed to get 1:22 even though I fell into the lake. The best time achieved was 1:04.

There was a reporter from the local newspaper talking with people.

The person running the speleo-olympics thought that he could have done better but the hot tub took some of his materials.

I was very surprised when I won a prize for my time.

ON THE LAMB

by
Mike Substelny
from
CLEVE-O-GROTTO
NEWS
August 1989

The Great Lamb Rescue of 1989 is already becoming a Grotto legend (Cleveland). Before the story gets distorted by others, I have decided to put the details down on paper (true and otherwise). This way I get to distort it myself.

The fourth of July outing involved several caving trips and several attempted caving trips. Among these was the Sunday night expedition to Wetback Cave. Ray Setteur was going to lead Floyd Herold, Elaine Harman, Charles Pflanze, Jenifer Pflanze, and me to the entrance of this little-known cave. Everyone in the group planned on doing the cave trip except for Ray and me, but even we brought our gear with us. He and I rode in the lead car.

On the way, "Speedway" Setteur gave a truly professional display of evasive stunt driving on one-lane mountain roads. He managed to lose the rest of the group behind a cloud of dust. They took a wrong turn and we lost an hour getting ourselves back together.

When we finally got out of the cars it was the middle of the night. The cave entrance was not easy to locate because the local terrain had been changed by the big flood. Ray and I scouted ahead, always in the cave's general direction, for about twenty minutes before we spotted the right sink. We yelled to the rest of the group to follow our lights up the hill to the spot. While we waited for them I noticed two pairs of glowing eyes watching us. Then there were three pairs .. then four ... and they were coming closer! I suppressed visions of being mauled by wolves or bears or mountain lions.

The glowing eyes belonged to cows. A mixed herd of heffers and bulls of various sizes and breeds proceded to gather around us. By the time our group was ready to enter the cave we were surrounded by dozens of these curious cows.

Large rocks had fallen into the entrance, making it a rugged, narrow vertical drop. Floyd would be the first on to descend; no discussion was needed. As he squeezed his body between the rocks I was waiting for a splash at the bottom (Ray wouldn't name a cave "Wetback" for nothing). But when Floyd reached the floor all we heard was silence. For a long moment we waited. We looked at the cows. They looked at us.

Finally Floyd spoke up. "Uh, Ray? There's a lamb down here."

The same image went through all of our minds. Moldy, mushy, mutton remains. Yuch!

"How long has it been down there?" asked Ray.

"A couple of weeks."

Fresh mutton mush! Double Yuch! We were all having second thoughts about the cave, then Ray asked, "Can we get around it, Floyd?"

"No, Ray, this lamb is ALIVE."

We all just stared at each other for a moment. You could have heard a cow pie drop. The lamb was in a small room just below the entrance hole. The room was not big enough for two people. There was a trickle of water nearby but no food, yet the lamb did not seem to be hypothermic. A few feet away was a fifteen-foot pit that it had miraculously avoided.

The lamb itself was so big that it seemed unlikely that it could have fit through the entrance drop (we failed to find any larger holes in the area). It had a large green spot painted on its back that was obviously a means of identification. It was standing erect and did not seem to be injured, but it was very hungry.

Jennifer gathered grass and passed it down to Floyd. The lamb ate steadily as we planned its rescue. We decided that it was too large to lift with our bare hands, so Ray and I went back to the cars for vertical gear. We were escorted both ways by a veritable stampede of brave bovine beasts. While we gone Charles stood on a hilltop and

flashed his camera strobe at regular intervals. This beacon made the task of finding the cave again much simpler.

When we returned there were even more cows in the area, and Floyd had figured out how the lamb had gotten inside. A big bush reached out from the pasture a good distance above the cave entrance. The lamb must have been snacking on the bush and fallen. Its inertia when it hit the rocks was enough to force it through the tiny entrance and into this predicament.

We dropped two loops of webbing down to Floyd. He coaxed the lamb over to the webbing and slipped one loop under its front legs and the other under its back legs. We lifted it out carefully because it had to come in an awkward position, head first and tail last. Even so it was a tight fit as fleece scraped rock on its way out. Charles recorded the moment on film..

Ray quickly fashioned one section of webbing into a leash and collar. I took the leash and lead the lamb to graze among the cows as we pondered the biggest question of the evening: WHAT DO WE DO NEXT? We could just leave the lamb in the pasture, but it was weak and could not escape from the local predators. We could try and locate a flock of sheep for it to join, but if we chose the wrong flock we might start a shootin' feud. We could try to find its owner (difficult at 1:00 am), but we did not want to tell him he had a lamb-eating cave on his land (bye, bye Wetback!).

We decided on the most difficult course, finding the owner. We would return the lamb, but we would say we found it in nearby Sinks-of-Gandy cave. No farmer could seal that cave!

Floyd and I took turns carrying the lamb to the cars. When we got there we teathered it to Ray's back bumper and took off our caving gear. The lamb was so hungry that it did not even struggle to get free, it just munched peacefully. Our plan for transporting the lamb featured Floyd sitting in Ray's open hatchback with the lamb in his arms as we rumbled down the road. It was quite a spectacle, and it worked.

The first few houses looked vacant. At

A good eight or ten minutes passed with no sign of Floyd nor Elaine, but no gunshots either. When they finally did come back, they brought the identity fo the lamb's owner: Mr. Teter (brother of the Teter who owns Sinks of Gandy). We could return the lamb to the sinks Teter and everything would be fine.

Up the long driveway, behind three gates, we left the lamb safely chomping grass in the Teter yard. Bye bye, Baa Baa.



NOTES

ON

MAKING SALTPETRE

FROM

THE EARTH OF THE CAVES

BY MAJOR GEO. W. RAINS

CORPS OF ARTILLERY AND ORDNANCE,

In charge of the Gunpowder Department, C.S.A., late of the U.S.A. and former Ast. Prof. Chemistry, &c. U.S.M.A.

AUGUSTA, GA.:
Steam Power Press Chronicle & Sentinel
1861.

SUPPLEMENT - SEPTEMBER 1989 - COG SQUEAKS

Page I

FORWARD

NOTES ON MAKING SALTPETRE by Major George W. Rains was originally printed in 1861. Burton Faust obtained a microfilm copy from the Library of Congress some years ago which has been passed to the Huntsville Grotto through Bill Varnedoe. The original microfilm has since deteriorated beyond use, making this copy one of very few in existence.

This limited-edition printing, made possible by retouching and enhancing the existing copy, has been donated to the National Speleological Society with proceeds designated for the NSS Office Fund.

The Huntsville Grotto
March 1973

FORWARD FOR THE SEPTEMBER 1989 SQUEAKS

I obtained a copy of Major George W. Rains' NOTES ON MAKING SALTPETRE at the Sewanee NSS Convention and decided to reproduce the booklet in the COG Squeaks. However, the quality is such that Xeroxing my copy does not produce decent quality copy; therefore, I am retyping the booklet while trying to maintain the spirit of the original typesetting.

Thanks to my wife, Karen, for proof reading this material and making sure that it remained true to the original. Spelling errors (or perhaps variations in spelling) were left intact as were punctuation errors (or perhaps variations in punctuation).

Bill Walden
COG SQUEAKS
SEPTEMBER 1989

HOW TO MAKE SALTPETRE

The process of making Saltpetre from the earth of the limestone caves in the Southern Confederacy is so simple that any one residing in the neighborhood of a cave in a limestone rock--and nearly all the caves are in such rock--can without any expense make at least a few pounds of the salt every day, and with assistance could make it a very profitable business at the price which Government is now paying. To furnish the practical information required, in plain language, to such persons, so as to enable each one to add to the production of an article so indispensable to the military operations of our country, now struggling for its free existence, induces the writer to publish these notes; he would earnestly appeal to his countrymen who may live near any cave, to put themselves, if need be, to some inconvenience, in order to aid in the invaluable production. We cannot be too thankful that this gigantic war was entered upon with large supplies of ammunition and the materials for its fabrication, but little of which has yet been expended; but in a contest of such magnitude, where we have to supply the fiery food for some two thousand mouths of large dimensions--some of which consume not less than three-fourths of a keg of powder at each charge--it will readily be seen that the most abundant stores must fail sooner or later, unless care be taken in time to replenish the demands of consumption.

Our supplies of sulphur--and, of course, charcoal--are probably ample for the entire war, even if it be of long duration, and the amount of saltpetre in the earth of the Southern caves, to be had for the washing, is abundantly sufficient to meet all demands for an indefinite period of time.

But the nitre is still in the earth, and it behooves us to extract it in time, before we commence to feel a pressure in this direction. It is true we are receiving daily from a few caves what would be considered a very large amount in ordinary times, but the times are extraordinary, and hence require extraordinary supplies; thus the individual who makes a pound of saltpetre each day, contributes in fact more to the ultimate success of his country, than if he shouldered his musket and marched with all his sons to the tented field.

Gunpowder is made of over three-fourth parts of nitre (purified saltpetre,) fourteen parts of charcoal and ten parts of sulphur, all by weight; hence the nitre is much the largest portion of gunpowder material, requiring consequently the largest daily supply.

The crude saltpetre from the caves--called **grough saltpetre** in commerce--requires to be purified before it can be used for gunpowder, and for this purpose Government has established a refinery at Nashville capable of refining daily 5000 pounds of grough saltpetre into pure nitre, as white as snow, and ready for the powder mills. In the extensive Government Powder Works now in course of rapid erection in Georgia under the direction of the writer, over five tons of saltpetre will be refined each day if required, and converted into gunpowder.

ARTICLES WANTED TO MAKE SALTPETRE ON A SMALL SCALE.

One ordinary iron pot, for boiling; three or four tubs, pails, or barrels cut off; two or three small troughs; some coarse bags or a wheelbarrow to bring the earth from the cave, and four strong barrels

with one head in each--empty vinegar, whiskey or pork barrels are very good--are about all the articles required for a small saltpetre manufactory. To these, however, must be added some ash barrels to make potash lye, as it is better than this should be made at the same time and place, the ashes from the fire under the pot for boiling assisting in production.

HOW TO PROCEED

First bore a hole about the size of the finger through the head or end of each barrel near one side, and fit a wood plug to each hole--then set the barrels on some pieces of timber near each other, the heads down, and the hole of each projecting over the timber. Put some twigs into the bottom of each barrel, and on these place straw or hay about half a foot thick when pressed down; then, having brought some of the earth from the cave, and broken up all the lumps, fill each barrel full without pressing it down. Put the plugs into the holes tightly, and fill up each barrel with as much water (hot water is best in winter) as it will hold; allow the whole to remain until the next day, then pull out the plugs, having placed a tub or pail under each, and pour all the water from the first barrel into the second barrel, and pour all the water or liquor which drains from this barrel must be poured on top of the earth for the third barrel, and finally the liquor which drains from the last barrel must be poured into a tub or other vessel. Now having previously made some strong lye from wood ashes, pour a small stream of it into the tub and stir it well; immediately the clear liquor will become muddy, and as long as the lye continues to curdle or cloud the liquor, it must be poured in; of course you will have to wait now and then for the liquor to settle to see if it requires more lye. No more must be used than is necessary, for it not only wastes the lye, but is an impurity which the refinery must afterwards get rid of. We will suppose that the proper quantity of lye has been used, and the liquor allowed to settle or drain through cloth until it becomes clear; it is then poured into the pot and boiled away until a drop taken up by the end of a stick becomes hard or solid when let fall upon cold metal or upon a plate.

The liquor is now to be dipped out of the pot and poured into a cloth placed over a tub or barrel, and allowed to strain through into the tub below and become cold. As soon as the liquor begins to cool, crystals of saltpetre will commence forming, and when cold the liquor left--called mother liquor--must be poured off from the saltpetre back into the pot with fresh liquor for boiling, as it still has considerable saltpetre in it. There will be found at the bottom of the pot after the liquor is dipped out, when boiling is completed, some earthy salts which, after draining, can be thrown away as impurities; if, however, some long needle-shaped crystals should be seen in it when cold, it contains some saltpetre, and about a quart of hot water should be added, and then poured off after a time, when it will have dissolved all the saltpetre left among the earthy salts; this wash water can then be put back into the pot after the impurities shall have been cleaned out.

The Saltpetre formed by the foregoing process must first allowed to drain well, and then placed on cloths stretched before the fire or out in the sun to dry; when the drying is completed, it is to be put into sacks or barrels, and is ready to be transported to the Government Agent at Nashville, Lieut. M.H. Wright, C.S.A. ordnance officer, who will pay for

the same on receiving bills of its shipment on the railroad.

If the crystals of saltpetre are wet and brown, and will not keep dry, it is because too much lye from the wood ashes has been used; this can be removed by nearly filling a tub or barrel with the saltpetre and pouring cold water on it, as much as the tub will hold, and after remaining about one hour, the water can be drained off from the bottom, when it will carry with it most of the lye; this wash water must be poured into the lye of the wood ashes so as not to lose the saltpetre which it contains.

The foregoing process evidently contains all that is required in principle for the making of Saltpetre on a large scale, since nothing more is to be done than to increase the numbers of barrels and boilers. Casks would be better perhaps than barrels in such a case, and vats made by placing the lower ends of pieces of plank about four feet long into a trough, and opening or spreading out the upper ends about three feet, then making ends to the vat, is an economical and convenient arrangement, which may be used on a small as well as a large scale, instead of casks or barrels. In making use of these vats, strips of wood should be placed over the edges of the planks on the inside, and a thick layer of twigs and straw should be placed at the bottom between the planks on the inside, as well as along the sides and ends to about one foot of the top of the vat, and kept there by pieces of wood leaning against the sides, whilst it is filled with earth from the cave; if this is not done, the liquor will in many cases drain through very slowly, and time lost to no purpose. A hollow or channel about a foot deep should be made along the centre of the earth in the vat, to collect the water poured in.

Whether vats, casks or barrels be used, the same principle must be carried out of passing the leached (or drained) liquor from the first vessel into the second, and from the second to the third before boiling, otherwise there will be much time and fuel lost in useless boiling of a weak liquor; this is a common error at the caves, and causes the saltpetre to cost more than is necessary in time, labor and fuel.

We will now follow the process of leaching more particularly. Suppose it takes eight gallons of water to fill up the barrel after the earth has been put in even with its top, or nearly so, then about one-half or four gallons only, will drain off, generally; we must now refill the barrel with four gallons more of water, and this time four gallons will drain or leach out, because the earth has already been charged with water. Again we refill the barrel the third time, putting in four gallons of water more, and after four gallons of liquor (or as much as will drain away) has again leached off, the earth must be thrown out, and the barrel refilled with fresh earth from the cave.

It will now be explained how to proceed so as to have a regular rotation of the barrels, as they shall be emptied one after the other of the old earth and refilled with fresh earth from the cave. It will be supposed at first the the work is on a small scale, then there will be required four barrels. if it be desired to proceed economically; to make it clear, we will suppose that these four barrels are placed round in a circle near each other, and three of them are filled with fresh earth, the fourth remaining empty. Now when the earth of the first barrel has been exhausted of saltpetre by the three washings, it will be thrown out, but instead of filling up this barrel with fresh earth, we fill up the fourth or empty barrel, and this can be going on during the leaching. Thus we have three barrels working as at first, the fresh barrel being

the third in the new series, and receiving the leached liquor from the one next to it. The first barrel of the new arrangement, however, has already been washed twice, before the new barrel was filled with earth; hence, after washing it once more with the four gallons of water, which it has received from the barrel just emptied--which quantity drains off and is poured into the one next to it--the earth is removed and this barrel left empty. Barrel number one, which we first emptied of the old earth, having now been refilled with earth from the cave, becomes the third in the new arrangement, and so on.

The liquor of the first of the three working barrels being always poured into the second barrel, and the liquor which leaches from this to be always poured into the third barrel, and finally the liquor which drains from the barrel is to be put into the vessel, where the lye from the ash barrel is mixed with it and the whole allowed to settle. When the liquor has become clear by settling or being strained through a cloth, it is ready to be placed into the kettle for boiling down. Thus there is a continual rotation of the work of the barrels without disturbing anything and constantly providing strong liquor for the kettle to be boiled without losing any saltpetre in the earth thrown away. It will generally take two days for the liquor to drain off from each barrel, but the time will vary with the nature of the earth, as a sandy one may take but a few hours whilst a clayey one may take 3 or more days. In this case it would be better to mix sand with the earth, leached ashes, or gravel, or even hay or straw than to lose so much time. If vats be made deeper than a barrel, more time will be required to leach them off, which of course is to be avoided, as nothing is gained by taking two or three weeks to leach off a large vat, whilst the same earth in smaller vats or casks may be leached off in two days.

With regard to mixing the lye of the wood ashes with the liquor of the third vat of barrel, the proper way is to take a certain quantity, say one pint, of the liquor and put it in a clear glass, then gradually add the lye and stir well. So long as the lye curdles or clouds the liquor more must be added. When sufficient lye has been used, allow the liquor to settle and become clear, then add a few drops more lye, if it no longer clouds the liquor, sufficient has been used, and if adding the lye has been done carefully no more has been employed than was just necessary to precipitate the impurities. We will suppose one gill of lye has been used to the pint of liquor, then it would take eight gills or one quart of lye to eight pints or one gallon of liquor -- hence, knowing the number of gallons of liquor, it is easy to see at once how many gallons of lye must be added without further trial.

The above experiment may be employed to ascertain if any earth contains Saltpetre, for if the lye of wood ashes causes a curdling, or muddies the water in which a considerable quantity of earth has been mixed and then drained off, we may presume that there is Saltpetre present, and the quantity will, ingeneral, be in proportion to the amount of curdling. A slight clouding of the liquor may be produced by other salts being present instead of Saltpetre, but if there is much curdling it is a pretty sure sign of Saltpetre. If there be any doubt, however, allow the muddy liquor to settle, then draw it off and boil down until it thickens, then dip a slip of paper into it and dry it well, touch a coal of fire to the paper and if it burns rapidly and sparkles, you may be sure Saltpetre is present.

I making lye fom wood ashes it is well to remark that the leaves,

bark, branches and limbs of the tree contain more potash than the trunk and that the oak and ash are generally the best woods to get ashes from. In leaching the the ashes a similar arrangement may be used, as for the Saltpetre liquor, that is four barrels may be used together in the same way, keeping three filled with ases and the fourth empty, and passing the lye from one to the other as before explained. By this means strong lye is always on hand to be used, and the Saltpetre liquor is not watered too much by a weak lye which has to be evaporated away at an expense of fuel and labor.

I will now speak of the economy of labor in the operations: thus, if the cave is sufficiently large and light enough, or can be lighted cheaply by fire -- the ashes of which may be used -- it is evidently cheaper to carry the vats and boilers into the cave just where the earth is, or near by, than to carry the earth out in bags to the outside of the cave to be leached. Again, it is more economical to bring water to the earth than the take the earth to the water, when both are outside of the cave, as is sometimes done, because there is much less weight of water used. By pursuing the method pointed out no time or material is lost -- each day has its regular recurring operations to be performed -- no surplus water has to be boiled away, and no lye is wasted, rendering the Saltpetre impure.

To give some idea as to the quantity of Saltpetre that can be made, I will state that twelve barrels of the earth of the caves will in general, make not less than one hundred pounds of Saltpetre, and this will take from twelve to fifteen bushels of ashes.

If the twelve barrels are arranged in four circles or rows, with an extra or fourth barrel to each row, then a barrel of the leached earth cav be emptied from every other row each day, (or two barrels a day) and the same number filled with fresh earth, thus in six days the twelve barrels will have been worked through, and this can be done by one man, whilst a second man boils away the liquor and attends to the vats or barrels: a third man can more than supply the ashes used, and can assist in filling the barrels. Thus in six days we have the labor of three men, which is abundantly ample to make over one hundred pounds of Saltpetre unless the earth is difficult to be procured. If the earth is richer than that supposed, or if the leashing of each barrel takes but one day, instead of two, as will frequently be the case, then two hundred pounds of Saltpetre may be procured in the same time, but in the latter casse will require additional labor. This is at present worth seventy dollars, being the price which Government now pays for a limited time at thirty-five cents per pound to encourage its production and to remunerate individuals for first cost of apparatus.

Those who manufature Saltpetre on a considerable scale will find it convient to have two or more casks or cisterns sunk in the earth, to receive the mother liquor from the evaporating kettle, where it is left for twenty-four hours to crystalise its Saltpetre.

In boiling the liquor from the vats or barrels, after it has settled or been strained from the sediment formed by adding the lye, a thick skum will rise to the surface which must be skimmed off, as it forms and thrown on the top of one of the vats, so as not to lose the Saltpetre that may be dissolved from it.

The bottom of the pot or boiler, after a time will become foul from the lime and earthy salts deposited on it, which can be prevented, if thought necessary, to a considerabel degree, by sinking in the kettle a

small pot with a wide mouth. The sediment will collect in this pot and can be removed from time to time, because the liquor remains comparatively still within it and allows the salts to settle, whilst the agitation of the boiling prevents the sediment falling to the bottom of the kettle.

Saltpetre made after the foregoing directions will not have above five per cent of impurities, but if carelessly made will have much more, and as these have to be separated at the refinery, before it can be used for gun-powder, such Saltpetre is not worth so much to Government.

Tasting the earth to see if it will yield Saltpetre is not a very accurate way of determining the fact, because the lime Saltpetre has less taste than the Potash Saltpetre, and the former is the only one mainly in the earth, which lye converts into ordinary, or potash Saltpetre. Thus an individual might be deceived into rejecting earth which may yield a sufficient quantity, if worked.

REMARKS

In order to call attention to the very considerable loss sustained by imperfect working of the earth of caves, I will state that at a certain cave in Georgia, which was examined by Professor Pratt, of the Oglethorpe University, who kindly furnished me with the result of his analysis -- it appeared that in earth which actually contained not less, on the average than 90 pounds to the barrel -- much of it containing 120 pounds -- only about 67 pounds were obtained. The one-fourth at least of the entire amount of Saltpetre was lost, or about eight dollars to each barrel; also, the amount of labor employed was abundantly ample to have obtained and leached, daily, twice the quantity of earth that was done, of which there was sufficient within 200 yards of the mouth of the cave to furnish forty-five thousand pounds of Saltpetre. Hence the loss at this cave was as follows, for each 12 barrels of earth actually leached at the time.

Twelve barrels of earth or 90 pounds of Saltpetre lost to one barrel leached, which, at 35 cents, amounts to -----	\$31.50
One quarter of the Saltpetre lost to each leached barrel, or 22 1/2 pounds, at 35 centss, amounts to -----	7.875

Total loss, -----

\$39.375

Here was an actual loss to the proprietor of nearly forty dollars; thus he received for each 12 barrels worked, obtaining 67 pounds only, ----- \$23.45

Should have received, with proper working, with the same amount of labor and capital, in the same time, 24 barrels or 180 pounds, ----- \$63.00

The above case is a sufficient demonstration of the necessity of pursuing the method laid down in these notes for the making of Saltpetre.

HOW TO REFINE SALTPETRE

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ARTICLES REQUIRED ON A SMALL SCALE

Two evaporating kettles or sugar pans capable of containing about forty gallons each; one kettle or boiler holding not less than twenty-five gallons; one barrel arranged with a hole and plug at bottom, and covered loosely with two thicknesses of bagging, or coarse cloth, at its open end, forming a bag for straining; one shallow wooden trough six feet long, three feet broad, and nine inches deep, for cooling; one wooden rake; one spade or shovel, having a long handle; one wooden straining box or trough, three feet three inches long, twenty inches broad and six inches deep, with several small holes in its bottom -- this box is placed on the top of the long trough, at one end; one wash barrel, having a second bottom pierced with holes about three inches above the true bottom, this second bottom is to be covered with coarse cloth -- between the bottoms a hole and plug are made; one cask to receive wash water; one cask or barrel nearly filled with water to receive all the refuse Saltpetre, and in which the old filtering cloths are thrown to dissolve out their Saltpetre; one cask or large barrel to receive mother liquor one platform scale or set of steelyards; together with some buckets, drying cloths, &c.

HOW TO PROCEED.

Weigh out two hundred and twenty-five pounds of Saltpetre and put it into the kettle or boiler, with sixteen gallons of water; light a fire under the kettle and let it boil -- not too briskly, however -- for about two and a half hours, removing the skum which rises to the surface, which should be thrown into an empty barrel. Cold water must be thrown in occasionally to keep the liquor to the same height in the kettle, for it must not be allowed to boil away. After the boiling is finished, allow the fire to die out, and dip out the liquor -- not allowing it to cool -- into the cloth on the top of the straining barrel, whence it is allowed to run into the long cooling trough; hence it is constantly agitated by raking it forwards and backwards by means of the wooden rake, until it has cooled down to about blood heat, which will take probably two hours or more. During the time of cooling, large quantities of fine needle-shaped crystals of nitre will form in the liquor, which are taken out by means of the long-handled spade, and thrown into the draining trough on the end of the cooling trough. When the liquor has sufficiently cooled down, run it off into a cask sunk into the earth for that purpose, by means of a hole and plug in one of the lower ends of the cooling trough.

The crystals of nitre in the draining trough will now commence looking white as snow, and are to be left to drain until next day, when the nitre is removed to the washing barrel which should be cut off at such a height as shall be about half filled with the crystals.

This barrel is then to be gently filled with cold water to the top, and allowed to remain one hour, when the plug is taken out, and the liquor which is nearly saturated with nitre -- holding in solution all that remained of the mother liquor -- is allowed to drain off into the cask kept for that purpose. The nitre thus made is nearly pure,

sufficiently so for nearly all purposes, and can be made into gunpowder. To make the finest quality of Powder, however, the crystals must be twice washed before being taken from the washing barrel, cold water being poured in each time until the barrel is full, and after remaining one hour each time, is to be drawn, off as before, and the nitre well drained and then dried; the crystals now are entirely pure, and can be used for the best quality of gunpowder.

The foregoing is the process, on a much larger scale, pursued at the Government Refinery, under the direction of the writer, and is a great improvement on the old process, taking only one-sixth part of the time formerly consumed, and hence saving largely in time, labor, and fuel. It is, in the main, the method pursued at the celebrated Government Powder Works at Waltham Abby, England. The writer is now engaged in making some experiments by which he anticipates the process will be considerably shortened, thus enabling the Government Refinery to double its daily products without increasing the apparatus.

It must be observed that in recharging the boiler with Saltpetre, instead of putting in the previous amount of 225 pounds, only 200 pounds will be used, because in place of pouring in fresh water as in the first case, we will now make use of 16 gallons of the wash water from the crystals, which holds about 25 pounds of nitre in solution.

This is under supposition that the temperature of the wash water is about 65 degrees; but if it is colder than this, it will contain less nitre, and if the temperature be that of freezing only about 9 pounds of nitre will be found in the 16 gallons, instead of 25 pounds.

Where two washings take place, I find it much more economical in fuel to have a separate cistern to hold the liquor of the second washing, which is nearly a pure saturated solution of nitre, and this is used for the first washing in the next process; thus is saved the evaporation of a large quantity of water, which would require additional evaporating pans and furnaces. I find no appreciable difference in the purity of the nitre thus washed from that produced by the mode of washing of Waltham Abbey.

That portion of the wash water which is not used in the boiler with the new charge of Saltpetre, is to be removed to the evaporating pans with the mother liquor. In the cask containing the mother liquor from the cooling trough, there will be found next day a considerable amount of large crystals of saltpetre, which can be collected and thrown in with the rough Saltpetre. The method of evaporating the mother liquor, and crystallizing its Saltpetre, is entirely analogous to that already explained in making saltpetre.

It may be observed that about a gallon of liquor should be taken out each day from the waste cask and put into the evaporating kettles, whilst the same amount of fresh water should be poured into the cask, in order to prevent the water in this cask becoming saturated with the waste saltpetre which is from time to time thrown into it, as also what it acquires from the soaking of the filtering or straining clothes, &c. When the barrels into which the skimmings are thrown, becomes full, it is to be poured into a cloth placed over the cask containing the mother liquor; being drained, a small quantity of hot water should be poured over what remains, and then the refuse may be thrown away.

If a larger or smaller quantity of saltpetre be refined than that mentioned, then corresponding proportions of the saltpetre and water will be employed; thus in the Government Refinery at Nashville, 5,000 pounds of the salt are used with generally 360 gallons of water, which are

boiled together for four hours. The amount of impurities should regulate the amount of water used, but this is not of much moment in small refineries.

REMARKS

Refined Saltpetre is not required from the caves that is done by Government.

It was stated in the body of these notes that the Saltpetre should be put in bags or barrels for transportation, it may also be put up in kegs or strong boxes, the latter being made about two feet long and fifteen inches square (section) well nailed.

The Saltpetre may be sent to any ordnance agent that may be convenient, as will be seen by the advertisement below.

N O T I C E

The Ordnance Department, Confederate States, will pay thirty-five cents per pound for all Saltpetre delivered before the first of February, 1862, at any of the following points:

Capt. W. G. Gill, Augusta, Ga.; C. G. Wagner, Military Store Keeper, Montgomery, Ala.; Lieut. M. H. Wright, Nashville, Tenn.; Capt. W R. Hart, Memphis, Tenn.; Sanford C. Faulkner, Military Store Keeper, Little Rock, Ark. and at Richmond, Va.

J. GORGAS, Lieut. Colonel,
Chief of Ordinance.

Bill's Simplified Instructions for Extracting Saltpetre

by
Bill Walden

- A) Extract $\text{Ca}(\text{NO}_3)_2$ from cave soil by allowing the cave soil to stand in water for several hours.
- B) Filter the water from step A to obtain the $\text{Ca}(\text{NO}_3)_2$ liquor.
- C) Extract KOH from hardwood ashes in a method similar to step A.
- D) Filter the water from step C to obtain the KOH solution.
- E) Slowly add the KOH solution to the $\text{Ca}(\text{NO}_3)_2$ solution until the mixture no longer clouds.



- F) Filter to remove the $\text{Ca}(\text{OH})_2$.
- G) Heat gently to evaporate water and concentrate the KNO_3 .
- H) Cool to effect crystallization.
- I) Filter to separate the crystals from the mother liquor and return the mother liquor to the solution from step F.

What's the Big Deal With Saltpetre?

by
Bill Walden

According to Major George W. Rains, "Gunpowder is made of over three-fourth parts of nitre (purified saltpetre,) fourteen parts of charcoal and ten parts of sulphur, all by weight;". By "three-fourth" I assume he meant 3/4 of 100 parts. The exact proportions are 74.6% saltpetre, 13.5% charcoal, and 11.9% sulfur. Thus, saltpetre is very closely 3/4 of the material comprising gun powder.