

Ice Technicians Reference Manual's



2007-2008

ICE TECHNICIAN'S REFERENCE MANUAL

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INTRODUCTION

The Ontario Curling Association Ice Team has an ongoing commitment to provide assistance to member clubs and has prepared this OCA Ice Technician Reference Manual for use by those individuals responsible for the ice and plant operations in curling clubs.

This manual is intended to address the immediate needs of the curling club ice technician in a general way. It provides a basic checklist of items of concern to the club and the ice technician no matter what size of club you have or what experience you have.

As all curlers should be provided with, and appreciate, keen, consistent ice, we have structured this manual to help you in building a working relationship with the club that will produce the desired results. In many cases curling clubs have wasted their resources on schemes or trends rather than building a plan that best utilizes the facilities and personnel available. Too often little thought and attention is given to developing a program that will ensure the best ice possible.

We feel that the items discussed in the manual are of the utmost importance and we encourage you to seek out more details which are available by consulting existing CCA technical manuals and the OCA Ice Team, as well as manufacturers and suppliers, or by attending ice schools.

Updates to this manual will be made to the master manual on the OCA website when new and important information becomes available. The manual is intended for your use while you are responsible for the ice and plant and should be kept available so that the materials contained in it, as well as those gathered by you, are readily available.

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ICE TECHNICIAN/CLUB RELATIONSHIP

The following topics are designed to assist the ice chairman or club manager in building a mutually beneficial working relationship with the ice technician from the start so that the club can benefit from the best possible ice and a happy, productive employee.

Hiring

Without exception, the most important action taken by the ice chairman is the hiring of the club's ice technician. Not every club can afford to hire a full-time ice technician and instead may have to operate with a part-time ice technician, contract icemakers, or even volunteers. In all cases, the selection and supervision of the work force requires the same care and attention.

The following are some of the many ways to locate a good ice technician:

- **Recruit locally.**
Often the best candidate for the position is a club member or associate. This person may not have as much experience or technical expertise as you would like, but he or she may have the ability and willingness to do the job. An added bonus is that you know their work habits and can easily check references.
- **Rehire former employees.**
Consider re-hiring employees who left your club on good terms.
- **Advertising.**
By drawing responses from a broad cross-section of candidates, advertising will give you a good idea of the current market. Be selective and use well targeted advertising as part of your overall hiring strategy. Newspapers such as the Ontario Curling Report and the Canadian Curling News can provide excellent exposure.
- **Contact the OCA Ice Team.**
The individual members of the OCA Ice Team know a number of qualified ice technicians and individuals who may have shown interest. They are well placed to assess individuals who may be well suited to your situation.

It is more time consuming to train the wrong person than it is to hire the right person.

Some guidelines to follow are:

- **Know what you are looking for.** Take the time, before you begin interviewing, to decide exactly what technician abilities and personal attributes a person will need to handle a particular job and to do it well.
- **Play it straight.** Overstating the conditions and the opportunities of a particular job may convince a desirable candidate to accept it, but the employee isn't likely to last very long. The best policy is honesty, honesty about the club, honesty about the job, and honesty about the opportunities.
- **Look beyond appearances.** Naturally, the way a candidate looks, dresses and behaves during an interview will affect your hiring decision, but don't let yourself be so influenced by looks and personality that you forget to consider the two most important factors in hiring; whether the person *can actually do the job*, and whether the person *is willing to do it*.
- **Get off on the right foot.** Make sure that all newly hired employees are fully aware of their duties, organizational status and benefits. Take a good look at your orientation policy and ensure that it is adequate.

A sample of a hiring package used by one OCA club (Method, Curling Questions and Interview Sheet) is included in this section to provide a model you can use as is or alter to suit the needs of your club.

Remuneration

Obviously the resources available to the club to compensate the ice technician and his staff will vary greatly from club to club.

The high turnover of personnel can be closely related to the club's ability to fairly compensate the ice technician.

The cost of re-training or hiring qualified outside servicemen is considerable. The club should take into consideration the following when assessing value:

- Job description
- Ice technician's training
- Ice technician's experience
- Specific mechanical skills

A sample of a job description is included in this section and may be used as is or modified to suit the needs of your club.

Supervision

Most ice technicians would claim that they have several hundred supervisors. As the chairman of the ice committee, it is important that you solicit from the members, feedback on the performance of the ice committee and the ice technician.

Some suggestions to foster and strengthen the committee's role could include.

- **Use a team approach.** Creating a team feeling isn't all that difficult. It is mainly a matter of showing that different viewpoints, when constructively presented, are welcome.
- **Be receptive to suggestions.** Don't just wait for suggestions, encourage them. It is important that certain procedures be followed to ensure that the ice technician has some direction.
- **Reward initiative as well as results.** Show the ice technician that you value initiative and that you understand that, on occasion, it results in mistakes. Give him enough latitude to achieve his full potential.
- **Publish an in-house newsletter.** A newsletter is an excellent and inexpensive way to keep the members advised of the ice committee's news and policy changes. You can also use it to recognize outstanding performance and prepare the members for any changes that may be deemed necessary.
- **Make meetings meaningful.** Many committees hold regularly scheduled management/employee meetings as often as once a week. Such a policy can be productive, but only when the meetings hold a specific purpose. To hold a meeting simply for the sake of holding a meeting is a waste of everybody's time.

After you have chosen an ice technician, try some "people oriented" strategies that build morale. Praise is as good as a raise.

- **Do something special for special people.** The best way to encourage good performance is to acknowledge it. When you find that the ice technician is performing exceptionally well, show him by rewarding him. Never lose sight of the fact that it is hard to find well-motivated, hardworking employees and praise is an effective way of recognizing a job well done.
- **Keep the lines of communication open.** All employee complaints, justified or not, deserve your prompt attention as well as a prompt reply. When you do report back to the employee, be sure to tell him what action, if any, you took or are about to take. Take time to have informal one-on-one meetings with employees as such discussions keep them involved and motivated.
- **Don't forget the little courtesies.** Workplace surveys indicate that criticizing an employee in front of others is the worst breach of etiquette. A "good morning", a "thank you", and a note of appreciation when the situation calls for it, can go a long way in keeping your best people.
- **Be fair.** Most employees don't mind a reasonably tight ship as long as the basic rules and regulations apply to everybody, and as long as the discipline is tempered with compassion. Be firm, but be human as well. And before you fire someone, make sure that the reasons are valid and your decision is sound.

Performance Review

The evaluation process is intended to support appraisals of the situation in certain areas of development, with a view to making the best possible decisions about future progress.

There are three principal processes in program evaluation:

1. **Measurement**
To collect the information needed for decision making.
2. **Evaluation**
To make judgments based on the information collected through various means of measurement.
3. **Decision Making**
To make administrative decisions in light of the information provided by measurement and evaluation.

In measuring the development and performance of the ice technician, a co-operative approach utilizing two-way communication can provide useful insights to both the technician and the administrator.

The checklist on page 12 has been developed to jointly measure performance. The comments for each category should be listed as E-Excellent, G-Good, S-Satisfactory, U-Unsatisfactory, N-Needs Improvement, C-Cannot Be Improved

When jointly discussing the completed form, the ice technician and the administrator now have a basis for constructive criticism.

If both agree that performance on an activity is excellent or cannot be improved, then there is little need for further discussion. Likewise, if both agree that performance is unsatisfactory or needs improvement, then the item goes on a priority list. When different results appear, the basis for discussion develops.

Termination

The only thing harder than hiring is firing. It is never easy to fire an employee and often the termination is not entirely of the employee's making. A few suggestions for making an unpleasant situation a little less painful include:

- **Have adequate cause.** Before you fire someone, be sure that you have a good reason. Get whatever expert advice is necessary to be sure that you have a legal basis for the termination. More importantly, out of fairness consider giving the employee a second chance to correct any deficiency in performance.
- **Analyze what went wrong.** Surveys indicate that most top executives place the blame on management when an employee has to be fired. So the question you have to ask yourself is what led you to hire the person in the first place, and what you can do to prevent the same mistake from happening again.
- **Have all necessary separation information on hand.** The employee you terminate has the right to know immediately whatever benefits or entitlements are due. If there is accrued vacation pay, separation pay or a final cheque, have it with you at the meeting as well as the Unemployment Insurance Record of Employment.
- **Don't drag it out.** If the purpose of the meeting is to let an employee go, don't hem and haw. The longer you wait to spring the news, the tougher it gets.
- **Be extra tactful.** Do your best to give the employee that you are firing an explanation that he or she can live with, but by all means be truthful.

SAMPLE HIRING PACKAGE

Method

The following questions were asked after having reviewed the Ice Technician's Manual in complete detail. In that way, the interviewers would know if the person being interviewed knows what they are talking about.

As the person was interviewed, the interviewers took down the applicants answers in detail. The Interview Sheet was then completed after each interview by each of the interviewers and the scores compared. The applicant who received the most number of high scores was then offered the job.

Questions

1. Recent Experience (3-5 years)
Tell us of your experience in general.
2. Ice Plant
Explain the operation of the ice plant.
Comment on the following - compressors - daily log
 - controls
 - brine table
 - pumps
 - other
3. Ice Making
Briefly explain the procedure for ice making from start to finish.
4. Maintenance
How would you maintain the ice and equipment?
5. Communications
How and what do you communicate to the ice chairman?
 - Daily?
 - Weekly?
 - Problems?
6. Housekeeping
How do you keep the area clean? - Routine?
7. Hours of work
What would be your normal hours of work?
8. Education
Are you familiar with the CCA Ice Technician Manuals?
What certification level are you?
9. Responsibility
Do you take full responsibility for making sure that the ice is in top condition?

INTERVIEW SHEET

Date _____

Applicant's Name _____

- 5 – Excellent
- 4 – Above Average
- 3 – Average
- 2 – Below Average
- 1 – Low

<u>QUESTIONS</u>	<u>SCORE</u>
Recent Experience	_____
Ice Plant Knowledge	_____
Ice Making	_____
Maintenance	_____
Communication	_____
Housekeeping	_____
Hours of Work	_____
Education	_____
Responsibility	_____
TOTAL	_____

SAMPLE JOB DESCRIPTION

Ice Technician

Scope of work

The ice technician is accountable to the curling club ice chairman and is to perform the functions prescribed to him by the ice chairman. He/she is to perform the technical duties that will play a significant role in achieving, maintaining and improving the quality of curling ice.

The overall goal/objective is to ensure that the ice function is operated efficiently and effectively with special emphasis on consistency and communication.

Job Responsibilities/Qualifications

1. Initiate start-up procedures
2. Install the ice
3. Maintain the ice
4. Shut-down the facility
5. Perform summer maintenance and repairs
6. Maintain daily log
7. Communicate regularly with ice chairman
8. Budget preparation for ice requirements
9. Fire prevention and safety
10. Other duties as assigned by the ice chairman

Accountability

This position is accountable to the curling club ice chairman for the interpretation, application and fulfillment of his/her duties and responsibilities.

Relationship Responsibilities

He/she will keep informed on changing techniques relating to the fulfillment of the job description.

He/she will establish and maintain an excellent climate of working relations both inside and outside the club consistent with encouraging improved performance at all levels.

He/she will keep the ice chairman informed of the operations and of any unusual matters that may affect budgets.

ICE TECHNICIAN'S PERFORMANCE REVIEW

	E	G	S	U	N	C
START-UP PROCEDURES The start-up procedures were timely and well organized.						
Materials were properly prepared well in advance.						
ICE INSTALLATION All measurements were accurate.						
The paint and lines were well applied.						
ICE MAINTENANCE All daily maintenance procedures were adhered to.						
A mid-season ice maintenance program returned the ice to the original condition.						
A daily log was maintained.						
SHUT DOWN Rocks were properly and safely stored.						
The facility was returned to a condition ready for next season's start-up.						
PREVENTATIVE MAINTENANCE Daily maintenance procedures were followed and logged.						
A summer maintenance program, as outlined in the manual, was followed.						
COMMUNICATION Communications with the Ice Chairman occurred on a regular basis throughout the year.						
BUDGET All functions of the ice program of the club were executed within budget. Any deviation was noted.						
ATTITUDES AND GENERAL ATTRIBUTES The ice technician has strong personal motivation.						
The ice technician is good at planning & organizing work.						
The ice technician learns new tasks and takes on new responsibilities quickly.						
The ice technician is open minded and willing to consider ideas and solutions.						
The ice technician is willing to take time to train others and to delegate responsibilities.						
The ice technician is constantly looking for ways to work or manage more effectively.						
DATE _____	SIGNATURE _____					

E = EXCELLENT
G = GOOD

S = SATISFACTORY
U = UNSATISFACTORY

N = NEEDS IMPROVEMENT
C = CANNOT BE IMPROVED

SAFETY

To ensure your safety and that of your club members and visitors, certain precautions must be observed and certain safety devices must be maintained in the club. The following section will be added to on a regular basis and will detail these safety issues.

Safety Practices

1. Make certain that exhaust ventilation equipment is adequate and maintained in operating condition.
2. Provide a long rope for tying to a person entering a room likely to be filled with any refrigerant - to serve as a guide for his exit and for use in attempting to follow and locate the person in that room. Never go into a room with heavy concentrations of any refrigerant without another person nearby.
3. Provide emergency lighting, proper exits, gas masks and spare gas mask canisters.
4. Monitor the compressor discharge temperature and the lubricating oil temperature. Maintain within manufacturers prescribed top limit. Stop the compressor and determine the cause if it is noted that the top limit has been exceeded.
5. Avoid standing on piping. Eliminate excessive piping vibration immediately.
6. Maintain guards on belt-drive and direct-driven equipment.
7. Maintain relief valve piping to a diffuser located outside.
8. Never valve off a vessel filled with liquid refrigerant, unless it is protected with a properly sized relief valve. Never expose refrigerant vessels, drums or bottles to excessive heat.
9. Liquid refrigerant pumps should have properly sized relief valves whether positive or centrifugal type to protect against excessive pressure.
10. Use a "buddy system" for personnel making repairs in refrigerated rooms and engine rooms.
11. Develop an "emergency procedures plan" and arrange for rehearsals and training of personnel and club members in this plan. Know the location of: main liquid line shut-off valve, compressor shut-off switch, water hose.
12. Always wear a gas mask when making repairs in an area where a leak might occur.

Emergency Telephone Numbers

A sheet detailing emergency telephone numbers should be attached to the wall beside or above each telephone in the club. When an emergency occurs, stay calm and call the numbers listed in the following order:

- 911
- or
1. Fire Department
 2. Police Department
 3. Ambulance
 4. Ministry of the Environment
 5. Ice Chairman or Club Manager

If you have a fire or an ammonia leak, you should have someone assist you to evacuate the club immediately, in a calm and orderly manner.

Ammonia Mask

An up-to-date "CSA Approved" ammonia mask must be kept in a proper storage cabinet next to any doors leading to the compressor room.

Filters must be checked regularly and changed when required.

Ammonia Detector System

Where ammonia is present in any part of the refrigeration system, an ammonia detector system is required by law.

Please consult your refrigeration contractor for the appropriate ammonia detector system.

Fire Extinguishers

The proper number of the appropriate type and size of fire extinguishers must be properly located throughout the club.

Please consult your local fire department for the regulations concerning fire extinguishers.

New Employee Safety Training

Each time a new employee is hired, it is the responsibility of the club to acquaint that employee with all safety considerations, ie. procedures and equipment.

First Aid Kits

Complete, well stocked first aid kits should be kept in a place that is easily accessible. In addition, it is recommended that one person with basic first aid training be available in the club at any given time.

KEEP AN IRRIGATION BOTTLE READILY AVAILABLE CONTAINING 2½% EACH OF BORAX AND BORIC ACID IN DISTILLED WATER.

Gassing

1. Remove affected person to fresh air immediately
2. Summon a doctor.
3. Remove clothing if splashed with liquid or impregnated with concentrated vapour.
4. Do not remove clothing frozen to the skin.
5. Keep the patient still and warmly wrapped with blankets.
6. If conscious and the mouth is not burnt, give hot sweet tea or coffee.
7. Oxygen may be administered by a person authorized by a doctor.
8. If breathing fails, apply artificial respiration.

Liquid Splashed or Concentrated Vapour in the Eyes

1. Irrigate eyes immediately with a solution of 2½% each of borax and boric acid in distilled water and continue for at least thirty (30) minutes.
2. Summon a doctor.

Skin Burns from Splashes or Concentrated Vapour

1. Wash immediately with large quantities of water and continue for at least fifteen (15) minutes, removing all clothing while washing.
2. Summon a doctor.
3. After washing, apply wet compresses (solution of 2½% of borax and boric acid in distilled water) to affected parts until medical advice is available.

WHMIS Training

The Workplace Hazardous Materials Information System (WHMIS) is a Canada-wide effort to ensure that employers and employees are familiar with the safe handling, storage and use of any hazardous or potentially hazardous materials, both new and old in the workplace.

The Workplace Safety & Insurance Board (WSIB) hold information seminars periodically. For individuals wishing to attend this free seminar you can contact WSIB at

Toll-free 1-800-387-5540
Website: www.wsib.on.ca

To meet the law's requirements, employers must provide training and education for workers who work with or are likely to handle, or be exposed to, hazardous materials in the workplace. They need to understand the significance of hazard information, labels, material safety data sheets and hazard symbols. Information is to be provided to the worker in a way that will ensure that the worker is able to understand the hazards and knows how to deal with any emergencies.

Penalties For Non-Compliance

Penalties for non-compliance under the Canada Labour Code can be as high as \$100,000.00 or six (6) months imprisonment. As well, each province or territory has its' own regulations containing penalties ranging from assessment under the Worker's Compensation Board (WCB) to specific fines.

As the refrigeration system in a curling club contains hazardous materials, you are advised to seek out WHMIS training using the phone number and website information above.

Transportation of Dangerous Goods

The federal government has legislation regarding the transportation and handling of dangerous goods that may affect any ice technicians that do their own refrigeration service and/or painting. Proper training and certification of such training is required for anyone handling or transporting a variety of products, including ammonia and freon. Under the act, acetylene, ammonia and propane cannot be transported in a passenger vehicle and limits are placed on the quantities of other substances such as paints that can be carried in a passenger vehicle.

The Dangerous Goods Act was not enacted to deter employers from carrying on their normal type of business but rather to promote public safety and we recommend that you contact the Tourism & Hospitality Industry Health & Safety Education Program for further information on where to get training.

Ammonia Safety Data

Emergency Plan

Spill or Leak Procedures

Steps to be Taken in Case Material is Released

1. Initiate emergency response plan.
2. Stop leak if possible.
3. Evacuate personnel not involved in response activities.
4. Notify 911 emergency response officials.
Be prepared to give information such as:
 - Your name and position
 - Location and phone number at the emergency site
 - Some details of the emergency such as:
 - any chemicals involved or in the affected area
 - any injuries involved
 - any chance of hazard i.e. Fire, explosion etc.
5. Assess need to evacuate surrounding population.
6. Evaluate explosion potential in confined spaces.
7. Evacuate response personnel if explosion risk exists.

Waste Disposal Method

Contain run-off of liquid ammonia or water containing ammonia. Allow to evaporate or neutralize and arrange for disposal by approved disposal firm. For hazardous waste regulations, call Superfund Hot Line (800)-424-9346.

Exposure Hazards & First Aid For Ammonia

Inhalation

The gas is extremely odorous and is readily detectable at levels well below those which cause lasting effects. It is extremely irritating to the mucous membranes and lung tissues. A sore throat, coughing, shortness of breath and laboured breathing can develop. Repeated or prolonged exposure to concentrations higher than the IDLH of 500 ppm should be avoided without respiratory protection. Brief exposures to concentrations of 5,000 ppm or above must be avoided as permanent injury or death can result.

First-Aid:

1. Remove from exposure.
2. Administer artificial respiration or oxygen if breathing has stopped.
3. Seek medical aid.

Skin Contact

Contact with vapour concentrations higher than 500 ppm can result in irritation to moist areas of the body. Concentrations of 5,000 ppm or higher can result in burns to the skin. Contact with liquid ammonia causes frostbite and burns.

First-Aid:

1. Immediately flush with large quantities of water and continue for 15 minutes.
2. Do not remove clothing if frozen to skin.
3. Seek medical aid.

Eye Contact

Contact with gases at concentrations below 500 ppm can result in eye irritation and tearing. Above 500 ppm there will be extreme eye irritation with involuntary closure of the eyes and visual impairment.

Liquid ammonia will rapidly cause serious burns to the eye which results in permanent blindness.

First-Aid:

1. Flash with large quantities of water for 15 minutes.
2. Seek medical aid.

Ingestion

Swallowing liquid ammonia will result in immediate pain and burns to the mouth and oesophagus.

First-Aid:

1. Do not induce vomiting. Give 1 - 2 glasses of milk or water.
2. Seek medical aid.

START-UP

The following is a list of tasks to be completed annually prior to the ice installation. These tasks are to be done by the ice technician and/or an outside contractor. The date to begin start-up is approximately 6 weeks prior to the start of curling at your club and this date will vary from club to club.

A Start-up Checklist is included at the end of this section to ensure all tasks are completed.

Refrigeration Contractor

Book an appointment with a refrigeration contractor to re-check and start-up the compressor. It is important that the start up is done right, have your contractor do the initial start up.

At the same time, book an appointment with the refrigeration contractor for shutdown (date required - immediately following last day of curling).

Daily Log Book

Now is the time to start your daily log.

Photocopies of the daily log book are no longer valid. The log books must be pre-printed and pre-numbered so that pages cannot be removed.

A legal log book can be ordered from ORFA at 416-426-7062 (www.orfa.com)

Painting Supplies

Make sure that all installation supplies are on hand or have been ordered. e.g. ice paint, yarn, painting supplies, drywall tape etc.

If an outside contractor is used to paint the ice, now is the time to book the appointment if one was not made the previous year.

Cleaning

Clean all surfaces within the ice area. e.g. Walls, beams, light fixtures, floors, walkways, etc.

A solution of vinegar and water is suggested.

Equipment

Inspect sideboards and backboards for rot and repair and replace, if necessary,

Inspect bumpers for damage and repair or replace, if necessary. Bumpers may have collected dirt that should be vacuumed out so it does not fall on the ice when a rock hits it.

Check all equipment within the ice area.
e.g. dehumidifier, fans, heaters, lighting, etc.

Arrange for immediate repairs if you discover a need during your equipment inspection.

Inspect all ice installation and maintenance equipment and repair or replace where necessary.
eg. hoses, brushes, scrapers, mops, pebbling cans, pebbling heads, etc.

Sand Based Floors

Check, level and secure the pipes,

Add sand where necessary, making sure that it is level.

Check the header pipes.
Check clamps to ensure that they are tight.
It is recommended that you use stainless steel clamps as they will not rust.

Close all doors, seal the building and start up the refrigeration system and dehumidifier.

When the pipes cool they will contract, reseal any high pipes.

Start-up Check List		
TARGET DATE:	START DATE:	
Task	Date	Notes
Book Refrigeration Contractor		
Start Daily Log		
Inventory Installation Supplies		
Order Installation Supplies		
Book Painting Contractor		
Clean Ice Area Surfaces		
Walls		
Beams		
Light Fixtures		
Floors		
Walkways		
Other		
Inspect Sideboards & Backboards		
Repair/Replace Sideboards & Backboards		
Inspect Bumpers		
Repair/Replace Bumpers		
Check Plant Equipment		
Dehumidifier		
Fans		
Heaters		
Lighting		
Other		
Repair of Plant Equipment		
Inspect Installation/Maintenance Equipment		
Repair Installation/Maintenance Equipment		
Order Installation/Maintenance Equipment		
Check Pipes		
Level Pipes		
Secure Pipes		
Add Sand		
Level Sand		
Check Header Pipes		
Check Clamps		

ICE INSTALLATION

The following is a list of tasks to be completed during the installation of curling ice.

Recording Floods in the Log Book.

It is important to record such data as:

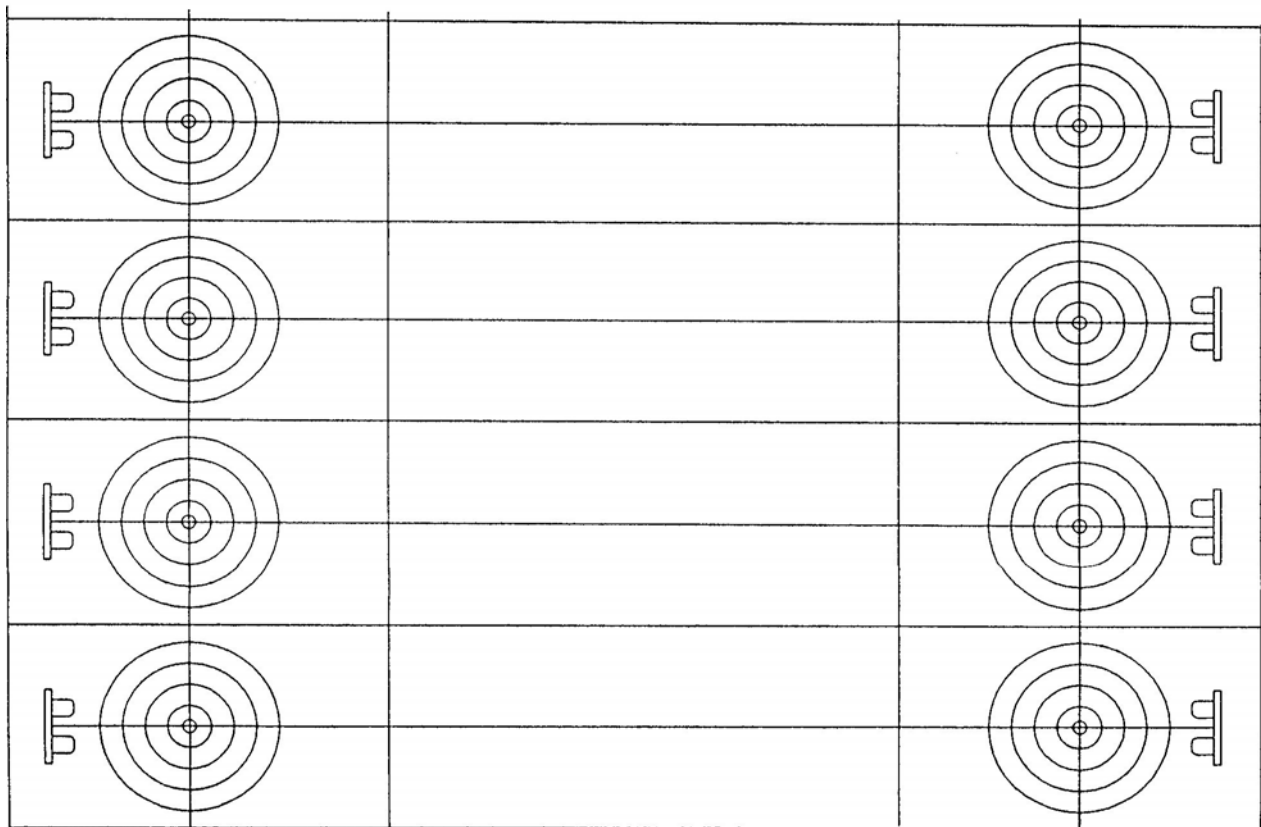
Time start and finish,
Ice temp start and finish,
Flood or spray number,
Gal/min,
Total gal.

Most of these can be recorded in your logbook if you do a record before and after a flood. The flood number, gal/min and total gallons used can be recorded in the comments section of the log. This way all the pertinent data will be easily accessible for future reference.

- Bring the brine temperature down. The suggested temperature is 20 - 22° F.
- As the temperature of the brine is coming down, check the temperature of the building and ice surface and record on your daily log. When the brine reaches the desired temperature, you are ready to begin installing the ice.
- If you do not have sophisticated probes, a simple method of determining when the desired temperature has been reached is to place 1" of water in a plastic glass and put it on the floor - when it freezes, the desired temperature has been reached and you may begin.
- Bring rocks out of storage and place on the backboards so they begin to cool down. Cover the rocks with plastic and check periodically for moisture.
- If you are on a sand base soak the sand using a garden watering nozzle. Soak only to the bottom of the sand do not allow the water to soak under the insulation.
- Use light sprays with a fine nozzle and apply water in layers until an even crust of ice has formed. Sand-based floors may require 10 - 20 applications. Concrete-based floors may require 3-5 applications.

Initial Floods

- Make sure that the perimeter is sealed.
This step is critical for good curling ice.
Slushing or drywall tape may be used and may have to be repeated to ensure a level ice surface.
- Apply 4 light even floods walking at a steady pace.
Time the first light flood and ensure that subsequent floods take an equivalent amount of time.
Never put on more water unless the total ice surface is frozen and the brine temperature is at least 26°F or lower.
- Install hacks (hack base if removable hacks are used) and centre pins at this time.
- Apply heavier even floods walking at a steady pace until the surface is level enough for painting and dries uniformly. A heavy flood will consume 80 - 100 gallons of water per sheet.



Painting

- Prepare the ice surface for painting by setting the temperature of the ice down to 19 or 20 degrees.
- Scrape to remove some impurities and to create a smoother surface.
- Be prepared to start painting immediately after scraping!
If you delay painting at this point, the impurities will rise to the surface, frost may settle and you will have to scrape again.
- Paint the entire white surface following the directions supplied by the manufacturer of the white paint. 3 fine coats, or even 4, are suggested. Make sure the surface dries between coats.
- Seal the surface with 8-10 light sprays of water using hose.
It is suggested that you begin the 1st spray from the backboards, stepping forward only when each sprayed section has frozen.

Remember to wear clean, cold footwear and to keep hoses moving from this point on.

- Outline the circles according to the specifications outlined in the General Rules of Curling using a template or a scribe and fill in with desired paint colours using brushes or rollers.

Remember to mix colours making sure you have sufficient quantities to complete the job as dye lots may vary.

- Lay tape or yarn to define the sheets according to the specifications outlined in the General Rules of Curling.
- Install the hogline according to the specifications outlined in the General Rules of Curling. It is recommended that the hogline be painted as bubbles may appear with the wide tape.
- Seal the circles, tapes and hoglines with 8-10 light sprays of water using a clean pressure weed sprayer. Making sure that you don't step on tapes or coloured paint.
- Seal the entire surface with 8-10 light sprays of water using a hose.

Finishing Floods

- Apply 1 light, even flood to the entire surface within 1½ - 2 hours after the final sealing.
- Apply heavier even floods until the desired level is reached (at least 2).
- Monitor each flood for uniformity of freezing to determine how many floods above 2 may be required.
- The final flood should be done with the brine set point turned up to 28 or 29 degrees or with the compressor and brine turned off until the flood is completed.

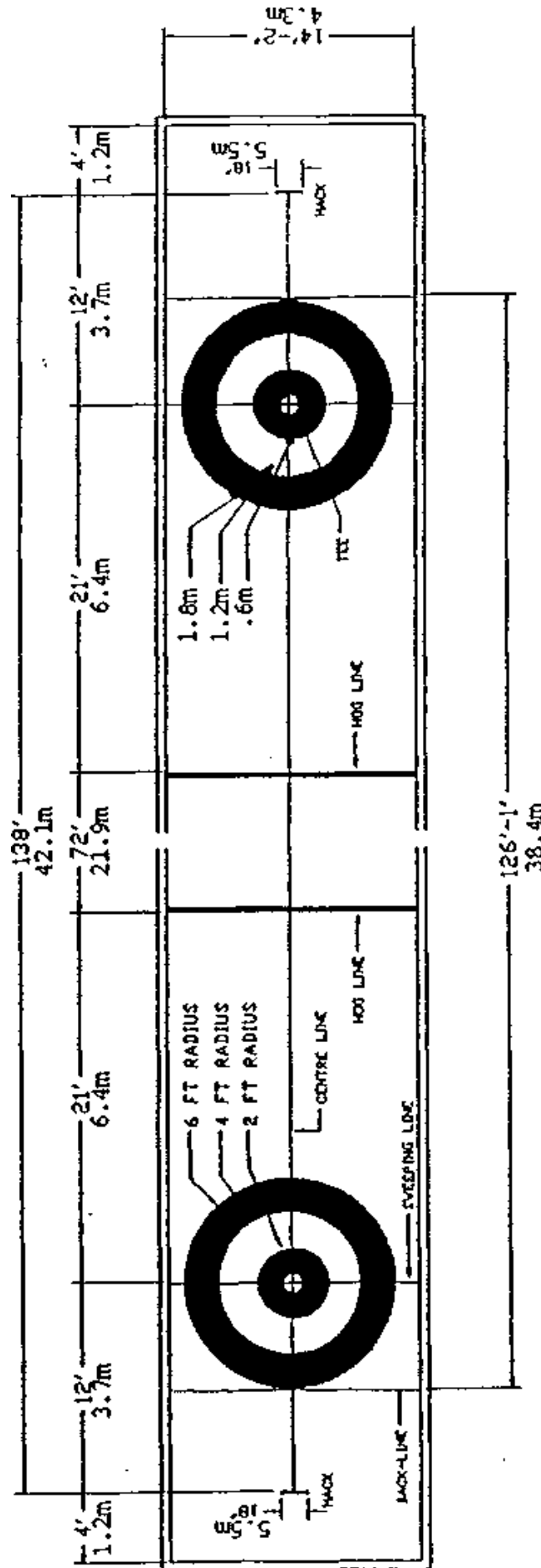
Thickness of Ice

- In order to keep control of the ice sheet it is vital to not let your ice get too thick. The maximum thickness that most curling club equipment is designed to handle is 1½ " - 2" but the desired thickness is less than 1" over the paint.
- Too much ice requires lower refrigerant temperature. This requires equipment to run longer and harder, thus increasing electrical and water costs as well as wear and tear on the equipment.
- Each club will require a different thickness but care should be taken to install the same thickness year after year once you have determined what works for your club.
- Clean out centres and hacks. Hand scrape the ends. Pebble behind the hacks.
- Wipe the rocks with a dry cloth and tighten all loose handles
- Place rocks on the ice surface on 2 layers of 6 mil plastic or on plastic mesh (dish drying sheets available from kitchen supply outlets). Remember to allow 24 hrs. for the rocks to freeze!
- Pebble and scrape the entire surface to remove as many impurities as possible. This pebbling and scraping process should be done 4-6 times to minimize the effect of "green" ice.
- Clean the total surface and pebble each sheet up and back.
- Break or nip the pebble

Congratulations THE ICE IS READY FOR CURLING!

Curling Sheet Specifications

- 1) The length of the sheet from backboard to backboard shall be 146 ft. (44.501 m). The width of the sheet from sideline to sideline shall be a minimum of 14 ft. 2 in. (4.318 m). This area shall be delineated by lines drawn or boards placed on the perimeter.
- 2) At each end of the sheet there shall be three (3) distinct lines drawn from sideline to sideline as follows:
 - a) the tee line, 1/2 in. in width, shall be placed 16 ft. (4.877 m) from the backboard to the centre of the tee line and there shall be 114ft. (34.747 m) from the centre of one tee line to the other tee line. The intersection of the tee line and the centre line shall be called the tee.
 - b) the backline, 1/2 in. in width shall be placed with the outer edge 6 ft. (1.829) from the centre of the tee line so that the outer edge will just touch the outer edge of a circle 6 ft. from the tee.
 - c) the hogline, 4 in. (10.16 cm) in width, shall be placed with the inner (circle side) edge 21 ft. (6.401 m) from the centre of the tee line.
- 3) With each tee as centre, there shall be drawn four (4) circles at each end with the outer edge of the outer circle having a radius of 6 ft. (1.829 m), the next circle 4 ft. (1.219 m), the next circle 2 ft. (60.96 cm) and the inner circle a minimum of 6 in. (15.24 cm).
- 4) The centre line, 1/2 in. in width, shall be placed the length of the sheet through the centre of the tees to a point 12 ft. (3.658 m) behind each tee. At this point, lines of 1 ft. 6 in. (45.72 cm) in length shall be placed at right angles to the centre line and shall be known as the hack line. The inside (circle side) edge of the hack boards shall be placed on this hack line.
- 5) The intersection of each tee line and each centre line shall be identified by an adjustable tee centre; with the base portion being securely anchored at the exact intersection of the tee line and centre line of each house; and the top portion being capable of vertical adjustment to suit varying ice levels. The design of the tee centre shall be accepted by the CCA.
- 6) The hack(s) shall be of a style and size accepted by the CCA. The hack(s) shall not exceed 8 inches (20.32 centimetres) in length.
 - (a) If two hacks are used, the back edge of each hack shall be placed on the hack lines and that the inside edge of each hack shall be no further than 3 inches (7.62 centimetres) from the centre line.
 - (b) If one moveable hack is used, it shall be placed with the back edge of the hack on the hack line and be either centered on the centre line or with the inside edge no further than 3 inches (7.62 centimetres) from the centre line (left or right).
 - (c) If one fixed hack is used, it shall be placed with the back edge of the hack on the hack line and centered on the centre line.



EQUIPMENT/SUPPLIES INVENTORY CHECKLIST

Qty.	Item
1	set Hacks (4 per set) for each sheet of ice
1	6' biters
1-2	Measures Hack covers for each sheet of ice
2	hand scrapers
1	Power scraper (4' or 5' blade)
1	Spare blade for power scraper
1	Ice nipper or rock pebble breaker (11 rock)
1	Mini burner
1	Hand-held propane torch
1	8' broom
2	Spare 8' mop heads
3-4	Corn brooms
1	2' - 3' hair brush
1	Plastic shovel or plastic dust pan
1-2	20 gal. plastic garbage pail
1	Wet/dry vac c/w 20' hose
1	200' x 1" flooding hose c/w shut-off ball valve (preferable rubber inside & green reinforced plastic outside – not red or black)
1	Flooding tube
1	Adjustable fine spray nozzle
1	Pressurized weed sprayer (back-pack style)
2 (min.)	Pebbling cans, plastic or stainless steel c/w 3/4" output hole (ID - no less than 5/8")
2	Non-collapsible hoses for pebbling can
1	Floor mop
1	Spare floor mop head
1	Squeegee pail on plastic wheels
1	Air temperature thermometer
1	Ice surface temperature gauge
1	Humidity tester

EQUIPMENT/SUPPLIES INVENTORY CHECKLIST (cont.)

Qty.	Item
1	Circle scriber
1	12' template
1	4' template
1	Roll of line string
	Assorted brushes for painting
	Assorted Plastic pails
4	Plastic paint trays
6	Horse hair brushes for circle painting
3	2" paint scrapers
2	Sponges for cleaning hacks
	Assorted wiping rags

Optional

1	14' ice melter
1	Ice cutter
	Spray painting apparatus

SHUT DOWN

Rock Removal

Immediately following the last draw of the season, remove the rocks and store them properly. (refer to Rocks pg. 3)

Refrigeration Contractor

A qualified refrigeration contractor should be on hand to properly shut down and check for possible problems.

Concrete Floors

Mechanical dehumidifiers are not designed to work in warm areas so it must be shut down as soon as the season is finished. Fans can be kept running and doors opened if the temperature outside is warmer than inside.

Turn the heaters up to 50 degrees and allow up to 48 hours for the ice to melt.

Remove, clean and store all centres and hacks.

Remove and dispose of all ribbons and yarn when the ice has melted enough.

Use a squeegee to move the paint, before it dries, to an area where it can be removed and disposed of in compliance with environmental regulations for your area.

Properly wash the floors and vent the building to prevent mildew.

Sand Based Floors

Vent the building to prevent mildew. Heavy duty screen doors will allow the building to dry but still keep the club secure.

Remove, clean and store all centres and hacks.

Remove and dispose of all ribbons and yarn when the ice has melted enough.

When the paint has dried it can be scratched, squeegeed and disposed of according to local environmental regulations.

Ensure that no pipes are exposed to sunlight

ICE MAINTENANCE - DAILY

The following is a list of tasks to be completed daily in order to maintain good, playable curling ice.

- Fill in slide areas in front of hacks as well as chips, hand marks and knee marks throughout entire surface.
- Empty garbage.
- Put out new boxes of tissues, if required.
- Sweep or vacuum the end walkways.
- Hand scrape in front and beside the hacks. If there is daytime and evening curling it should be done twice
- Scrape entire ice surface using different patterns such as 5-4-3 patterns, one pattern for each time you scrape.
- Sweep entire ice surface using 8' ice mop.
- Check ice temperature and air temperature and humidity periodically and adjust if necessary.
- Pebble all sheets with the required temperature. Keep in mind that lower humidity (under 55%) will require a lower pebble temperature even if it is very cold. The amount of pebble will vary with the humidity, temperature and number of curlers using the ice.
- Nip or break the pebble.
- Take down numbers from scoreboards.

ICE MAINTENANCE - WEEKLY

The following is a list of tasks to be completed weekly in order to maintain good, playable curling ice.

- Put clean 8' mop heads on as needed.
- Vacuum or sweep the sideboards.
- Move or lift the rocks and remove the hacks if you have the removable type and scrape the ends.
- Drill the centres.
- Scrape, pebble with cool water and scrape again to refresh the sheets.

ICE MAINTENANCE - MID SEASON

The following is a list of tasks to be completed mid-season in order to maintain good, playable curling ice.

- Remove rocks and place on backboards close to ice surface.
It is recommended that rocks be placed on cleaned carpet.
- Remove the hacks if you have the removable type.
- Scrape or burn the ice deep enough to remove some dirt.
- Hand scrape areas where the scraper and burner can't reach, e.g. corners and around hacks.
- Mop entire ice surface and remove snow.
- Complete a heavy flood or controlled melt.
 - ◆ Flood:
 - Turn the brine set point up to 29 or 30 degrees.
 - Apply a heavy flood.
 - Return the set point to playing temperature.
 - ◆ Controlled Melt:
 - Warm the air by turning the heaters up to 48 to 50 degrees or higher if possible.
 - Turn OFF THE BRINE PUMP and compressor to allow the ice to melt from the top. If the compressor is turned off but the brine pump is left running the ice will melt from the bottom.
 - After the top of the ice has melted and the entire pad is covered with water turn the brine pump and compressor on and reset the air temperature. The brine temperature can be left at playing temperature or raised to allow for slower more level freezing.
- When the ice has frozen scrape and pebble the ends.
- Set the rocks on the plastic mesh to freeze. Allow sufficient time before placing the rocks on the ice.
- Drill the centers. Clean out the hacks.
- Pebble and scrape till the ice is flat and clean.
It may take 3 times or more to achieve the desired results.
- Replace the removable hacks if removed.
- Pebble with the proper temperature and amount for the climate and calibre of curling.
- Nip or break the pebble for play.

SCRAPING

Scraping patterns seem to be complicated but they are not. The diagram on the next page shows the 3 pass, 4 pass and the 5 pass patterns. The 3 pass and 4 pass patterns, as in all others, can be varied to create more patterns but reversing direction or going inside out as opposed to outside in will not yield the differences in these patterns that can be achieved with higher pass patterns.

The only limits to the number of passes are your imagination and the time you are willing to spend on the ice. These patterns can also be varied by starting on or near the centre line and working your way to the outside or starting at or near the outside and working to the centre.

Starting from the outside and working in will help to control the dish or gull wing that will be created by pebbling. Going from outside to centre will put the middle of the blade on the crest of the dish and help to chop it down.

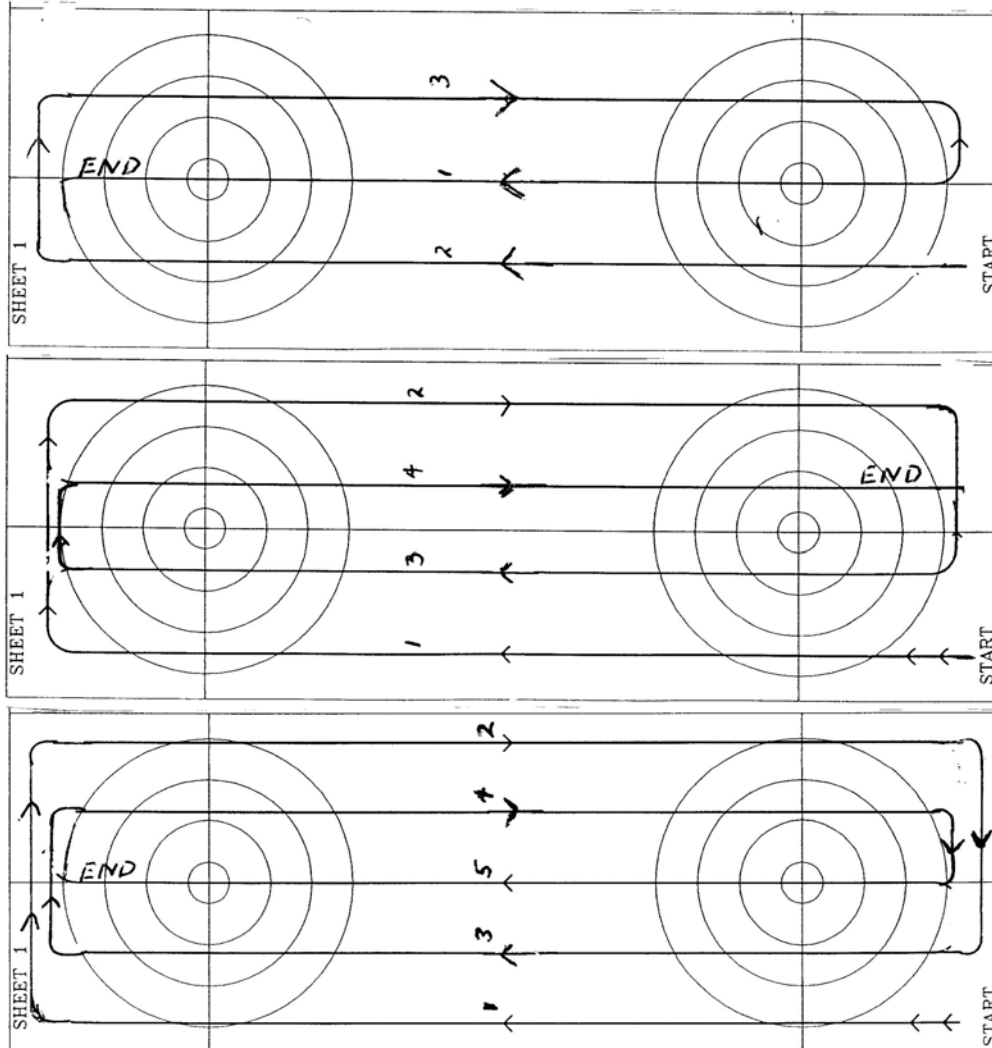
Starting near or on the centre will help keep the centre level.

If the problem of the dish or the centre becomes severe use a 3 pass scrape, pebble from eight foot to eight foot, then a full pebble and scrape again using a higher pass scrape.

Scraping should be done at least one time daily even if the ice is not used. This will keep the ice from becoming frosty or stale. If the ice is used in the daytime and the evening it should be scraped before each.

A heavy scrape, pebble and lighter scrape should be done at least one time per week.

Pass Patterns



ROCKS

The rocks are one of the most important assets in any club and care should be taken to look after them in order to ensure their long life.

It is recommended that the insurance on your rocks is up-to-date and is for "replacement value".

Moving and Cooling Rocks

- When moving rocks do not allow the bottoms of the rocks to hit or rest on any hard or abrasive material. Care must be taken not to damage the running surface.
- At the beginning of the season, follow instructions in the "START-UP" section to properly cool rocks as well as instructions for placing on ice.

Identification of Rocks

- It is recommended that rocks be engraved in the cup area on the bottom of the rock with an identifying number and that the numbers be recorded and placed in safekeeping.

Handles

- Plastic handles are recommended. These plastic handles should be engraved with the sheet number and a number from 1 to 8 for easier matching.

Matching Rocks

- It is advised that rocks be matched in pairs as well as by sheets, if possible. This is a short outline of how to match rocks.
 - Prepare the ice similar to the way you prepare for a game but use warmer pebble and nip or break more aggressively so the rocks do not have to break pebble.
 - Use a stop watch or a photo electric sensor to time the rocks from backline or tee line to the hog line. If the rocks time the same from these points they should travel the same distance and curl the same amount.
 - Good, consistent curlers should be used to throw the rocks and there must be volunteers there to record times and results for each rock.

Storage of Rocks

- Care should be taken when storing rocks for the summer in order to protect the running surface.
- It is recommended that the rocks be stored on their side in a cradle with space between the running surface of each rock..
- The cradles should be placed in a location where people won't be bumping them but one that is close to a fire exit.
- Each cradle should be loosely covered with carpeting to prevent damage from something being dropped on them.

To Resurface or not?

- Making the decision to have your rocks resurfaced is something that will take a great deal of careful consideration.
If your rocks exhibit the following signs and symptoms, you might have to consider resurfacing:
 - excessive pitting (refer to Trefers on next page)
 - running surface too wide (if polished they may fall)
 - running surface too narrow (they may be heavy)
 - inconsistency (some curl others are straight)
 - no curl (may just need to be scratched, see next page)
 - too much curl
 - too heavy
 - picking

Once you have noticed one or more of the above signs on a regular basis, you should follow the plan shown below to make your decision.

- Set up a committee to investigate and make the decision.
- Use other stones which are free of symptoms to verify that the ice is not causing the problem.
- Attempt to match the rocks.
- Contact the OCA Ice Team for assistance.
- Contact an independent contractor to meet with your committee and the OCA

Rock Types and Characteristics

There are a few different types of granite common to curling clubs in Ontario.

- **Blue Hone**

These rocks have the tightest grain and are very resistant to absorbing moisture but they are susceptible to chipping on the striking band. Some of these rocks with poor striking bands have been sacrificed to make inserts for other types of rocks.

- **Common Blue Hone**

These rocks share the qualities of the blue hones but are a little more porous.

- **Blue and Red Trefers**

These rocks are more porous which causes the running surface to pit naturally but because they are softer the striking band will last longer.

- **Keynees**

These rocks are also porous and are less frequently found.

Inserts

Inserts are made of blue hone granite and as the name implies are inserted into other rocks to make the best rocks that can be made.

Scratching Rocks

Many rocks in Ontario are either made entirely made of blue hone granite or have blue hone inserts in them which means that they are very resistant to moisture absorption so they do not pit as readily as other granites. This combined with the fact that the ice in most curling clubs is kept cleaner may cause the rock running surface to polish. When this happens the rocks will tend to run straight.

If all the rocks do not react the same they may need resurfacing on a lathe (refer to "To Resurface or not" on the previous page). If they have been recently resurfaced or have consistent sized running surfaces they may just need a little help.

For ease of mind and to ensure the best results for your club a qualified, experienced person should show you and give you the experience needed. Contact members of the ice team to give you names of qualified individuals.

PREVENTATIVE MAINTENANCE

If equipment is neglected you run the risk of breakdowns that could jeopardize curling either during the season or over the long run. Major repairs take time and could cost more money than the club has available. Continuing preventative maintenance will prolong the life of any equipment and it is suggested that the following checklists be adhered to in order to avoid problems.

Advise Your Board

Advise your Board of Directors of the life expectancy of the equipment so that funds can be budgeted for their eventual replacement as well as for their regular maintenance.

The refrigeration contractor will advise you of the anticipated life expectancy of your equipment but it is up to you to chart equipment and major components starting from installation and showing when it was overhauled and/or repaired. It is a good idea to have your own preventative maintenance program and keep your own records.

Preventative Maintenance - Daily

▪ Daily Log Book

Using a daily log sheet to document and keep track of your findings, make the following checks, at least once, but preferably twice a day.

- Check oil level in compressors.
- Check for leaks in water, oil and refrigerant.
- Check brine level.
- If the brine level is too low, it could signal leaks. If the brine level is too high, it could signal air in the system.
- Check operating pressures.
- Check compressor high pressure (discharge).
- Check compressor low pressure (suction).
- Check compressor oil pressure.
- Check brine pump pressure.
- Check water pump pressure.
- Listen to the noise level made by the machinery as a change in the level of noise could indicate a problem.
- Check the refrigerant level.
- Check water tank for level, dirt and the build up of solids.
- Check water temperature gauges on compressors.
- Ensure that there is a reasonable off cycle on machinery, compressors, pumps and fans.
- Short cycling can signal a problem, especially in compressors.

Preventative Maintenance - Periodic

- Drain oil from chillers and compare the logged consumption with the amount drained out.
- If the amount drained does not equal the logged consumption, there may be a leakage problem.
- Check water sprays on condenser and remove and clean, if plugged.
- Clean strainers as necessary.
- Check belt tensions, making sure machinery is shut off.
- Check couplings for wear, making sure machinery is shut off.

Preventative Maintenance - Summer

- As discussed in "SHUT-DOWN", dry the ice area out by opening screen doors (or vents).
- Turning fans on will keep air circulating and prevent mildew and the dry rotting of wood.
- Lift the header boards so that the headers can dry off.
- Check clamps, nipples and pipes for excessive rust and brine leaks.
- Spray or brush oil all over header pipes and nipples to extend their life.
- Continue to check the brine level at least once a week in the summer. If a leak develops, have it repaired immediately.
- Check the compressor room at least once a week in the summer watching for leaks in refrigerant, water and oil, and spin shifts on pumps and motors.
- Any problems noted should be repaired immediately.

Refrigeration Contractor

- Once a year, the head should be removed from the compressor and the heads should be examined and overhauled or repaired, if necessary.

- Every two years, the compressor and brine pumps should be looked at for wear, etc. The condition of the compressor should be checked specifically at the following locations:
 - cylinder walls
 - pistons and rings
 - discharge valves
 - suction valves
 - crank shaft
 - shaft seal or packing
 - oil pumps and filter
 - safety heads
 - connecting rods and wrist pins
 - main bearings
 - crankcase
 - manifold valves
 - forced feed lubricators