



CARLSON & STEWART REFRIGERATION, Inc.

Toll Free: 1-800-215-2576
csrefrig@carlsonstewart.com

700 Huron Road
Marshall, MN 56258
Phone: (507) 532-2576
Fax: (507) 532-3219

189 Industrial Blvd.
Sauk Rapids, MN 56379
Phone: (320) 253-5058
Fax: (320) 253-6765

600 N. Helen Avenue
Sioux Falls, SD 57104
Phone: (605) 334-7900
Fax: (605) 334-8100

To Whom it May Concern:

Recently the Red Baron Arena staff was attempting to start up their refrigeration system in order to start building ice after being down for a couple of months due to the Coronavirus. The safety controls on the system would not allow the system to be started up and so Carlson & Stewart Refrigeration was called in to help. After some troubleshooting it was determined that the ammonia/brine heat exchanger (chiller) had an internal leak and the ammonia side of the heat exchanger was full of brine.

These types of systems that utilize a shell & tube type chiller are very common in many ice rink refrigeration systems around the world. For the most part they are very reliable and very rarely leak. In the rare occurrences when they do leak, it is found to be very small leaks and the problem is identified before any significant damage occurs. Leaks are usually the result of a material defect/abnormality combined with some level of corrosion. The failure of the Red Baron Arena chiller was unusual in the fact that that the entire ammonia side of the chiller was empty of ammonia and full of brine. The circumstances of the system being down for an extended period of time is also unusual.

The investigation into how/why this happened continues to move forward and so far, no definitive cause has been identified. In these type of situations, with these type of systems that have many control and safety systems built in, which are based on many years of historical data, the first inclination would usually be that there was some type of human error. Our investigation has not been able to identify any such human error, other than not being able to confirm the recent status of the inhibitor in the brine. There is no indication that the system was operated improperly during shutdown, startup, or normal operations.

At this point, we only know that there is a large number of leaking tubes within the chiller. Based on this, all of the tubes are being replaced. Samples of the brine are being sent to a lab to see if there are any abnormalities that might give us a clue to why so many tubes are leaking. Efforts are continuing to get the system repaired, refreshed, and back into operation as quickly as possible. We are hopeful to be able to come across some more definitive answers but at this point the answers are not apparent.

Sincerely,

Chris Savage, PE
Engineer
Carlson & Stewart Refrigeration, Inc.