

Alcor A-1277

Case Report



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1. Overview

A member in the Yonkers, New York area had been in and out of the ICU at a local hospital for more than two months. Her son, also a member, was the liaison between Alcor and her medical providers. Despite numerous procedures and an encouraging recovery, she suddenly and somewhat unexpectedly succumbed to her illness, arresting at 5:55 AM (EST) on Friday, December 9th, 2011. Previous communications with the hospital and a local mortuary prompted immediate heparinization, circulation, ice application and an expedited release from the hospital.

The time needed for a team response was greater than simply initiating an immediate airline shipment. Therefore the patient's cooling was continued by the mortuary along with packaging and processing of the appropriate paperwork. The patient arrived in Alcor's surgery suite at 10:13 PM on Friday night at a temperature of 2.6° C. Whole body cryoprotection was completed early the next morning on Saturday, December 10th.

A-1277 became Alcor's 110th patient.

2. Personnel

Logistical planning and coordination: Aaron Drake, NREMT-P, CCT, Medical Response Director, Alcor Foundation; and Catherine Baldwin, Suspended Animation, Inc. They were supported by Max More, Ph.D., CEO; and Steven Harris, M.D., Chief Medical Advisor.

Surgery and cryoprotectant perfusion: Dr. Nancy McEachern, DVM, Surgeon; Aaron Drake, Surgical Assistant; Hugh Hixon, Cryoprotection Perfusionist; Steve Graber, Assistant Cryoprotection Perfusionist; Max More, Scribe; Bonnie Magee, Refractometry; R. Michael Perry, Ph.D., Cooldown Coordinator; Jerry Searcy, surgical support.

3. Background

Alcor received an emergency text regarding member A-1277 in September of 2011 from the individual's son, also an Alcor member.

The son called to say his mother was in a local hospital in Yonkers NY. She suffered a fractured arm from a fall the previous week, and had difficulty during recovery. The member, age 85, had been recovering at home, however went into the hospital with respiratory distress. The hospital indicated they needed to place his mother on a ventilator to help relieve her respiratory fatigue.

The son stressed to Alcor, repeatedly, not to contact the hospital, as he did not want to concern his mother or alert the hospital staff to her unique arrangements, just yet. He said that he would speak with her medical providers over the next few days. He continued that he would call us the following week, or if anything changed in the meantime. Alcor indicated that they would honor his request not to contact the hospital so long as he kept us apprised of her medical situation.

The following week we received a call from the son regarding his mother's condition. He said she was in the ICU on a ventilator but that she was improving. The source of her respiratory distress was cardiac tamponade, so the hospital had a pericardiocentesis scheduled in a day or two to remove the accumulated fluid. Her surgeon planned to create a pericardial window to facilitate longer term drainage. The son apologized for not informing us sooner and was very appreciative of our discretion. He promised to keep us updated frequently.

Over the next week, our member was successfully weaned from the ventilator. She was then moved to a step down unit after they removed her drainage tube and closed the pericardial window. She was eating solid food on her own and was reported to be improving rapidly.

Over the following two weeks, our member's breathing became quite labored again and the hospital moved her from the medical floor back to the ICU. She had been newly diagnosed with COPD and they decided to insert a pacemaker. They placed her on BiPAP (biphasic positive airway pressure) but she did not improve.

The son strongly expressed that he still did not want Alcor to contact the hospital out of fear they would reduce her quality of care if they knew about her cryonics arrangements. The son, who was funding his mother's cryopreservation, offered to sign some sort of agreement that would eliminate any repercussions for any people associated with his mother's suspension, should it not go well due to a delay in response. Alcor explained that our responsibility was to his mother and at some point we would need to override his request to refrain from communicating directly with her medical providers.

On October 5th, about a week later, we received another call that the mother was being taken into surgery for a lung biopsy. The anesthesiologist considered this a "high-risk" procedure due to her excessive accumulation of fluid in her lungs. With this news, Alcor tasked Catherine Baldwin of Suspended Animation to fly to New York to identify a local mortuary and to speak directly with the son about the seriousness of the situation in an attempt to improve communications.

The son called later the same day to inform Alcor that his mother was out of surgery and that she had come through quite well. The surgeon had identified a number of tumors and taken a biopsy with the results expected in a couple of days. She would go back on BiPAP until she recovered. When Alcor disclosed that a representative of Alcor was traveling to NY the son was very

surprised. Alcor explained that Catherine would be calling him after she arrived to meet with him and discuss some of the logistical challenges that we face when a member is in a hospital. The son seemed resistant to the idea, stating that he was really swamped at the moment. He offered that he would take a phone call from her if he had time.

Upon arrival, Catherine called and left messages for the son but no calls were immediately returned. She also visited the funeral home that had been identified and met with their owner and director. The mortuary had vehicles and prep areas close to the medical center that would be suitable for Alcor's use. They discussed possible scenarios in the absence of a team in place prior to pronouncement, and in the event that happened, Catherine left heparin and administration instructions with them.

Since the funeral director was a board member with the hospital, he took the opportunity to introduce Catherine to the hospital president and the vice president of nursing. She explained why she was in town and that they had a patient at their facility with cryonics directives, although she did not divulge the name of the individual. The hospital administrators expressed cooperation in assisting us and a willingness to expedite the death certificate sign off and quick release to the mortuary, if the events unfolded that way.

The son followed up with Catherine a day later and she told him about the meetings that she had and the people she spoke to. He seemed slightly upset and very paranoid that the physicians treating his mother would find out. However, she spent a considerable amount of time explaining all of the things that need to happen in order to stabilize and cryopreserve his mother. He acknowledged that these things could not occur at the last minute.

Almost a month passed before Catherine heard from the son again on October 31st. He called to say that his mother had been re-intubated and placed back on the ventilator. He still had not spoken to her physicians about her cryopreservation arrangements and was adamant about not doing so, even now. We made our best attempt to explain how important this was and how having good clinical information would allow us to make deployment decisions and get her the best care. He would only promise to try to give us "as much notice as possible."

Given the son's reticence, Alcor wrote a formalized letter that informed the son that while we were sensitive to his wishes to have his mother's postmortem directives remain a secret from the medical providers in charge of her care, we wanted to make sure he fully understand the potential problems that can occur as a result of this action. Although he may have been paying for her membership and cryopreservation, we asserted that our contract was with his mother, not him. Therefore we felt an obligation to remind him of the documents that she signed and the requirements that agreement imposed on Alcor. We asked him to sign-off on that letter, acknowledging that he understood those risks, which he did.

On November 15th, the son placed a call to Catherine to report that his mother was improving. Her doctors performed a tracheostomy, placed a feeding tube and put her on dialysis. The son said she was awake and alert most of the time. He also gave permission for Alcor's Chief Medical Advisor, Dr. Steven Harris, to contact his mother's personal physician, but repeated calls to the physician were unreturned. The son further stated that he would inform his mother's nurses that they could speak with Alcor representatives regarding her condition.

That night, Catherine called the patient's nurses for an update, but the nurses claimed they had received no such written authorization to release information. The nurses did share that the patient had dialysis yesterday and was stable but that she still remained on a ventilator. Fortunately, the son was present as he was visiting his mother. The nurse then passed the phone to the son, who expressed surprise that Catherine was still unable to obtain medical information about his mother. He explained that he would need to tell the Nursing Supervisor and possibly fill out a form that would specify our authorization to obtain medical information. He apologized profusely and said he would make sure that something was placed in her chart that very day.

Catherine called back on November 17th and received confirmation from the attending nurse that staff had been authorized to release medication information to her from the patient's chart and that they were to provide notification to Alcor of any significant change in her condition.

Unfortunately, the nursing staff's next communication came after the patient had been pronounced.

4. Post Mortem Actions & Transportation

At 5:55 AM, EST, on December 9th, 2011, A-1277 coded and was pronounced. Aaron Drake was notified by the hospital staff and he subsequently alerted everyone at Alcor. When the mortuary opened at 9:00 am, they were alerted to the situation and they coordinated with the hospital for a quick release. Multiple flights were considered by Alcor to get the patient to Scottsdale as quickly as possible, but the mortuary made their own arrangements after discussion with Steve Rude, from Rude Family Northwest Mortuary. The plans were far from ideal, and the mortuary would not alter them once they were booked.

Instead of a direct flight from NY to Phoenix, a flight was booked that had an extended cargo layover in Atlanta, before continuing on to Phoenix. No insulation was used with the wet-ice shipper and there were a variety of other transit related problems that were not considered that could have substantially delayed the arrival even more.

The patient arrived at Phoenix Sky Harbor airport at 9:33 pm (roughly 18.5 hours post mortem), was received from airline cargo by Rude Family Northwest Mortuary and transported to Alcor's facility in Scottsdale where the surgical team was standing by.

5. Surgery

The patient arrived at Alcor's surgery suite at 22:13 and was transferred to the operating table, covered with a base layer of ice, using a MegaMover. Additional bags of ice were placed on top of the patient. Aaron Drake aseptically prepped the patient's sternum while Dr. McEachern clipped the hair from the patient's head and then aseptically prepped the head.

Dr. McEachern made two vertical incisions with a #10 scalpel to expose the skull. The scalp was parted with Allport and Jansen retractors and bilateral burr holes were drilled by Aaron, using a Codman craniotome perforator. Dr. McEachern cleaned each of the burr holes with a Sperling-Kerrison rongeur prior to inserting a subdural thermocouple which was secured using a surgical stapler.

Dr. McEachern and Aaron returned to the chest to perform a median resternotomy, as the patient had a mid-line scar from a previous sternotomy. A vertical inline incision was made along the patient's sternum from the suprasternal notch to below the xiphoid process. The wires from the previous sternotomy had to be cut with a pair of wire snips and removed using a Mayo-Hegar needle holder.

Aaron placed the guide of the Sarns sternal saw under the sternum at the suprasternal notch. Steve Graber operated the foot pedal on the floor as Aaron lifted and guided the saw to divide the sternum. After the sternum was re-separated, the chest was opened with Finochietto rib spreaders, exposing the pericardial sac. Dr. McEachern accessed the heart by making an incision through the pericardium.

Dr. McEachern performed an arterial cannulation of the heart by sewing a purse-string suture in the wall of the aortic arch, puncturing the vessel within the purse-string, and advancing and securing the catheter. She then repeated this process for the venous cannulation of the heart, going into the right atrium and advancing the cannula into the inferior vena cava. The purse-strings were tightened around the cannulae and secured.

The arterial line was unclamped and return was noted. The washout continued for 23 minutes prior to the circuit being closed. The tubing was secured using a Cardiomed tubing loom. During the time of the washout, Dr McEachern returned to the head and inserted two crackphone elements bilaterally into the previously established burr holes and secured them with surgical staples.

6. Perfusion Summary

It is estimated that perfusate consumption consisted of 20 liters of MHP-2 and 30 liters of M22. The patient's weight was initially estimated at 160 lbs which should have required about 90 liters of M22. However, substantially less was used. The perfusion was terminated due to extrusion of the brain into one of the burr holes and distension of the abdomen. The final cryoprotectant concentration was 35.8 Brix (65% CNV). While ~30 liters of cryoprotectant was added to the system, only 5 liters of effluent was returned.

There had been pre-mortem edema and we experienced additional edema in the lungs and body with a concentrated area off-center of the abdomen. In addition, we noted drainage from the right burr hole containing substantial flocculent white matter, possibly indicating loss of cerebral integrity.

7. Surgery & Perfusion Timeline

December 9th, 2011, MST

22:13 A-1277 arrives at Alcor – Temp 2.6° C
22:24 Patient loaded on to MegaMover and moved to surgical table
22:34 Head prepped for burr holes
22:43 Burr holes established
23:04 Chest prepped
23:08 Median resternotomy commenced
23:38 Cannula inserted into right atrium
23:53 Cannula inserted into descending aorta

December 10th, 2011, MST

00:09 Washout begun
00:32 Circuit is closed
00:53 Crackphone elements inserted
02:02 Ramp paused due to slowly dropping pressure
02:29 Ramp restarted
02:53 Cryoprotection terminated
03:35 Patient moved to cooldown box
03:50 LN2 cooling commenced

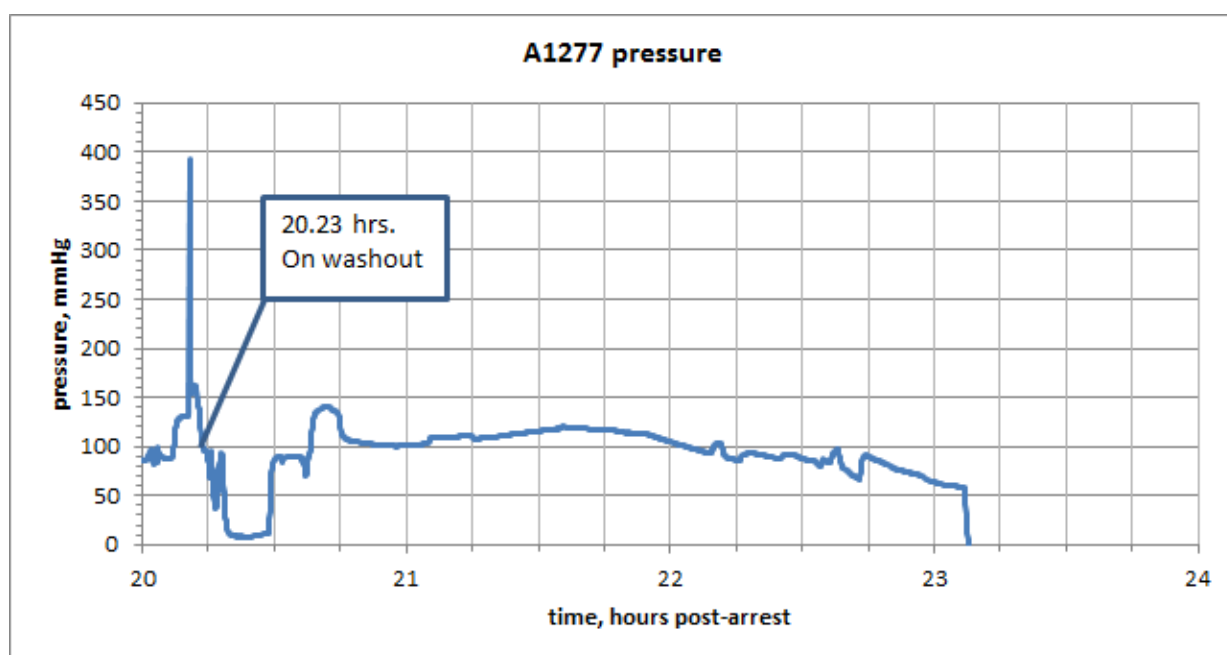
8. Issues and Actions

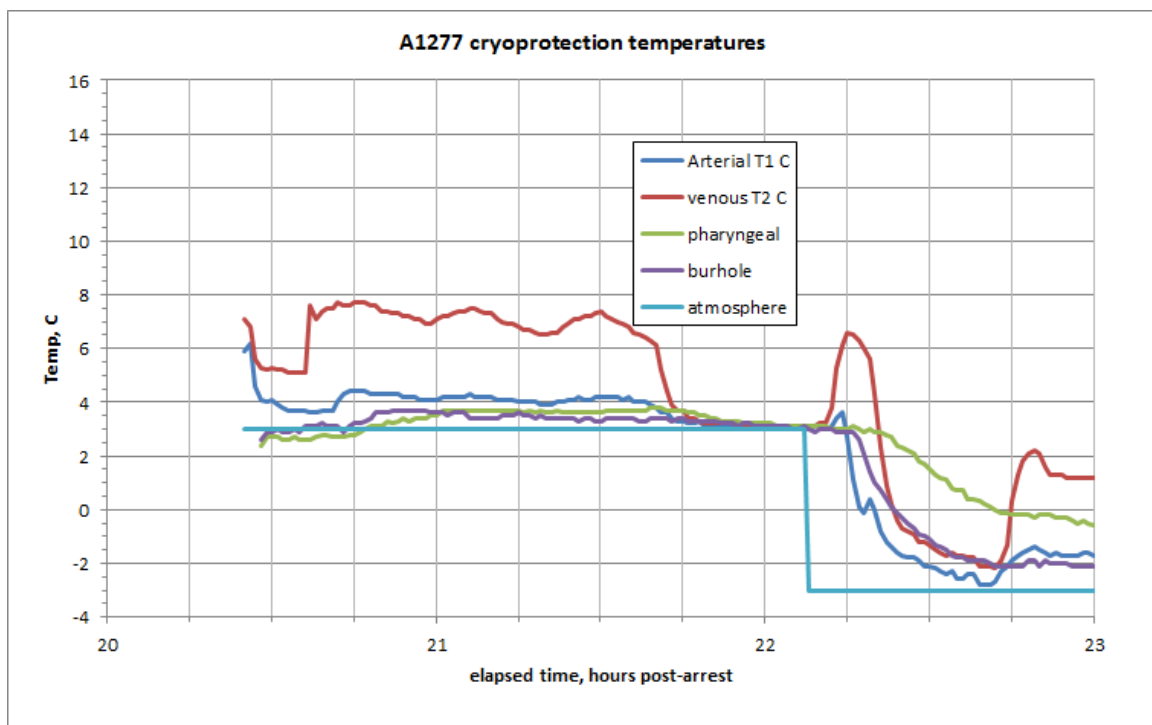
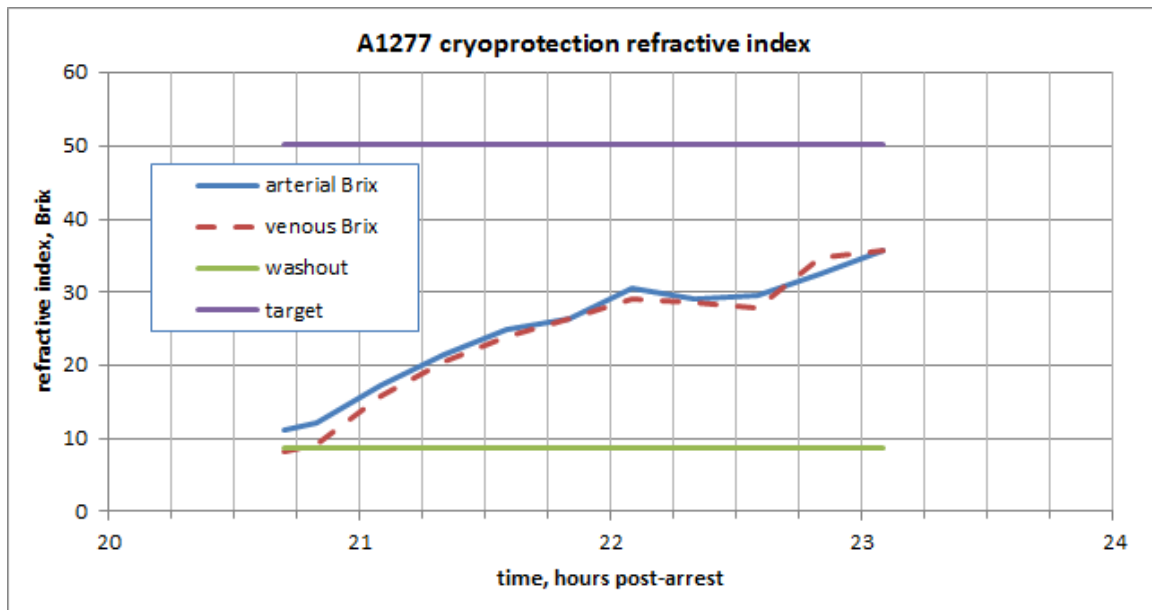
SURGERY AND PERFUSION

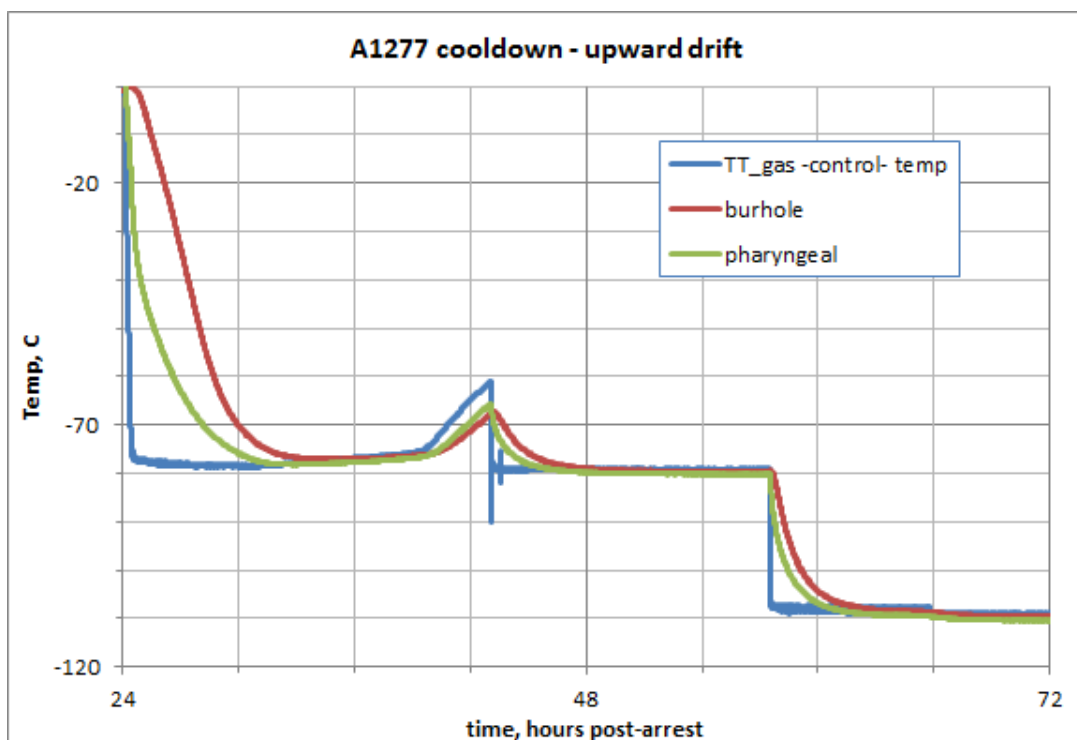
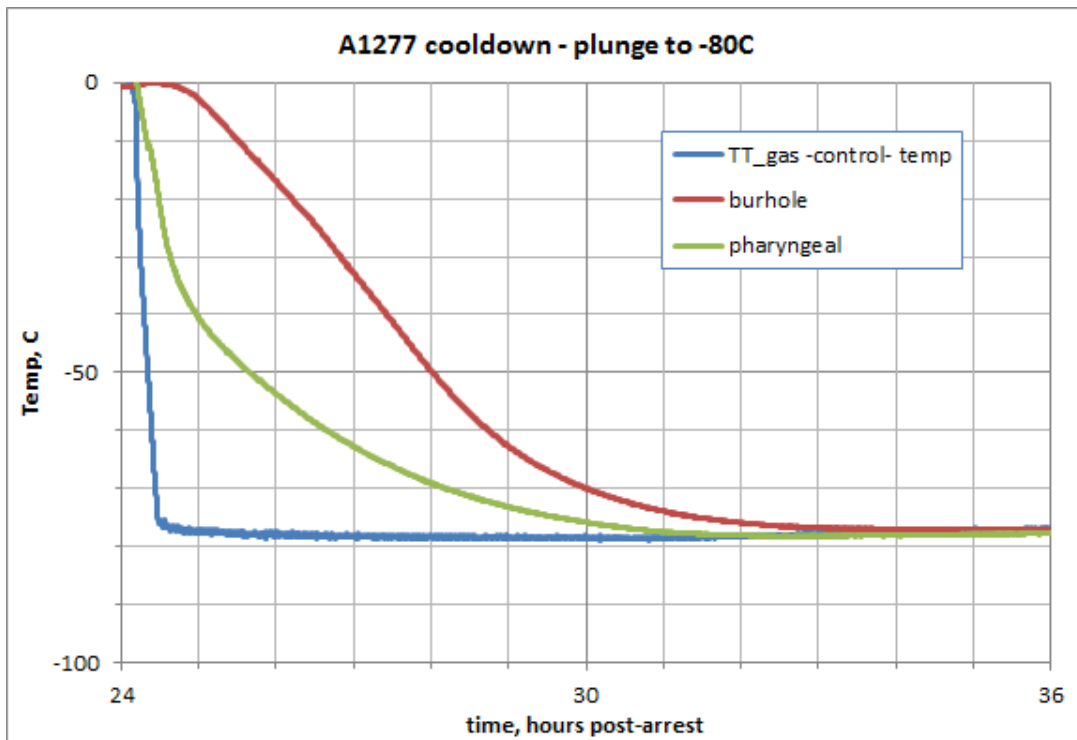
Problem: The data collection system crashed during the procedure and DuaLogRs were used as a backup to record temperatures.

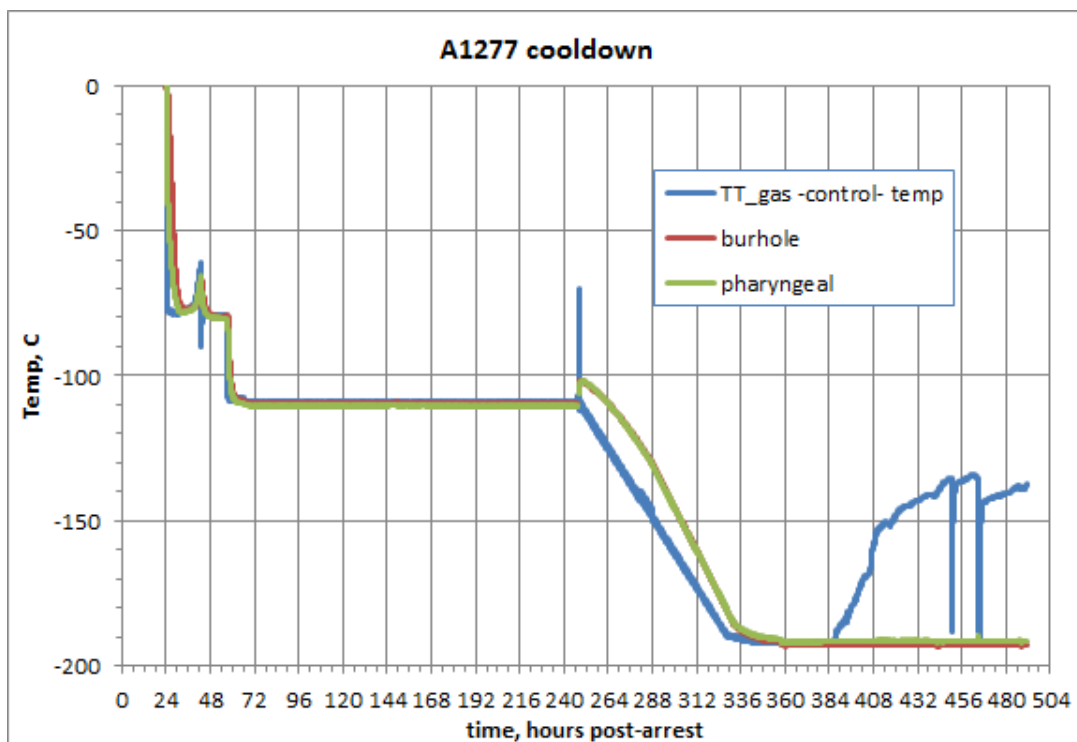
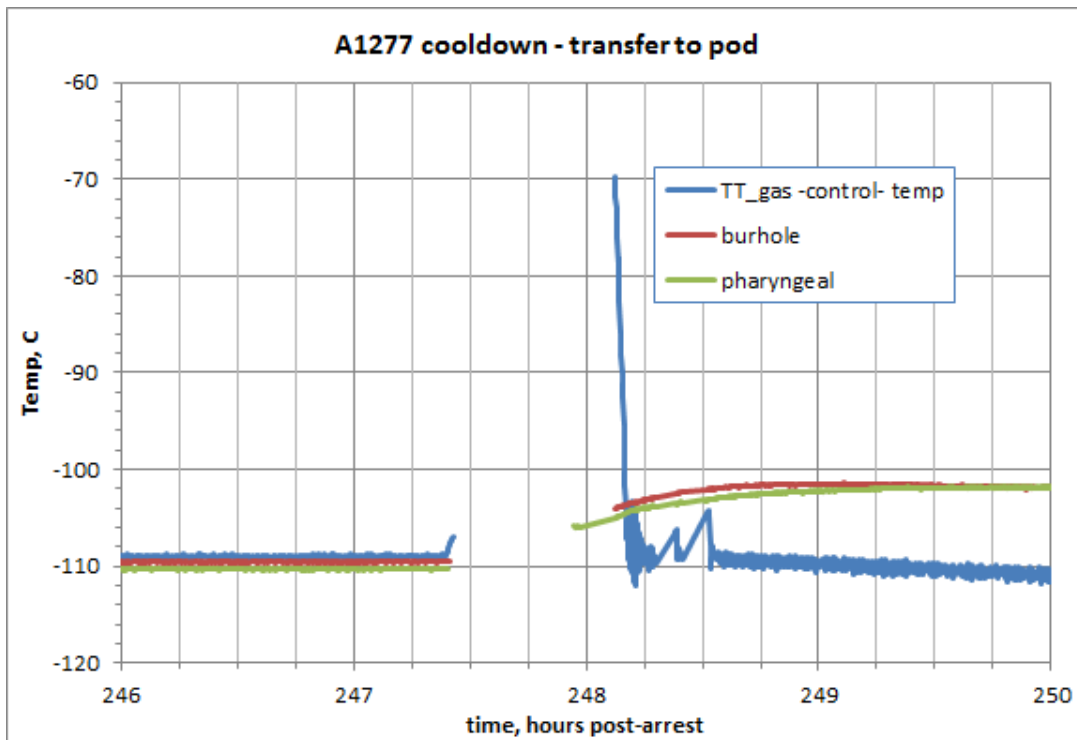
Corrective action: All of the internal wiring was replaced on the old data collection system however it continued to be unable to properly read thermocouple input, indicating the machine itself was malfunctioning. An entirely new data collection system was under development and has since been working without incident.

9. Graphs









Note: Extended hold time on above graph due to waiting on another whole body cooldown.

-- End of report --