

Giant Mine Remediation Project



Canada

MV2007L8-0031

4. FREEZE OPTIMIZATION STUDY

FOS OBJECTIVES

- Inform further engineering design
- Provide input to the environmental assessment and water licensing processes

FOS UPDATE

- Last report-back was in September hearing
- See “Report to the Parties” August 2012

Group J – Active, Series of 3 freeze pipes

Group K – Active, Series of 2 freeze pipes

Group H – Active, Four freeze pipes in parallel

Group L – Active, Series of 2 freeze pipes

Group G – Four - 2.5 inch Thermosyphons

Group M – Active, Three 3 inch freeze pipes in parallel

Chamber 10

Group F – Four - 4 inch Thermosyphons

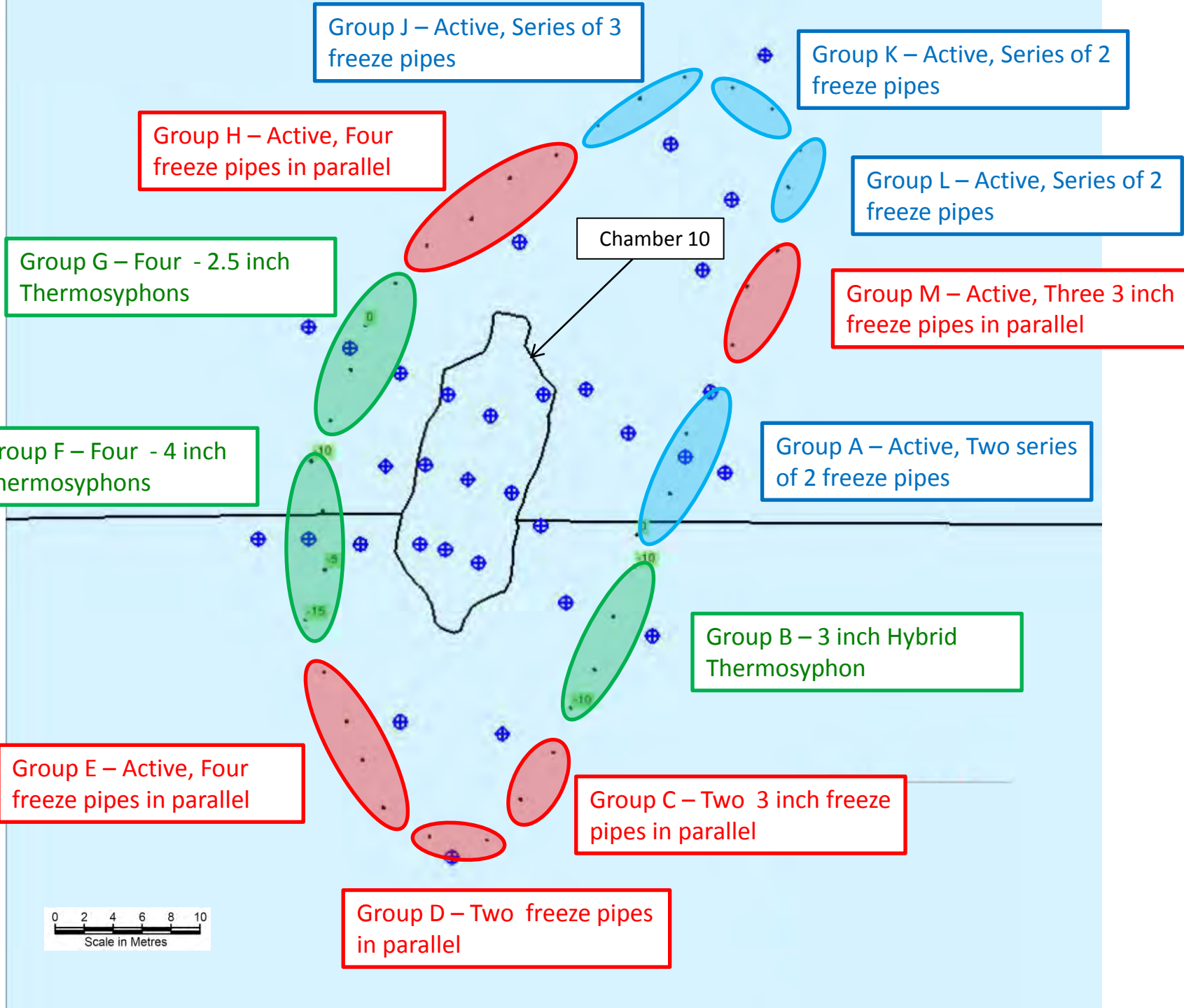
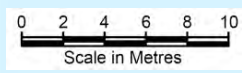
Group A – Active, Two series of 2 freeze pipes

Group B – 3 inch Hybrid Thermosyphon

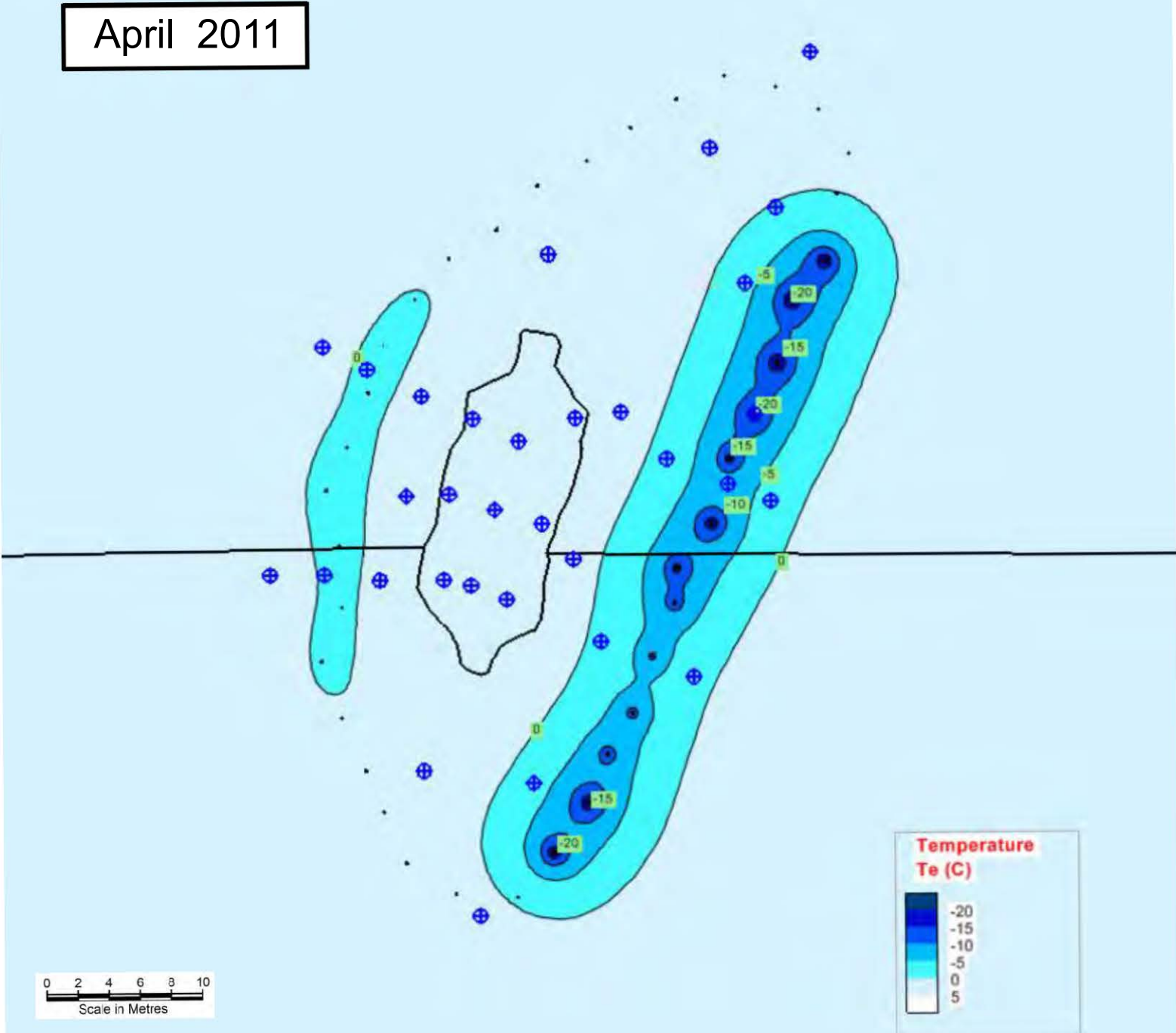
Group E – Active, Four freeze pipes in parallel

Group C – Two 3 inch freeze pipes in parallel

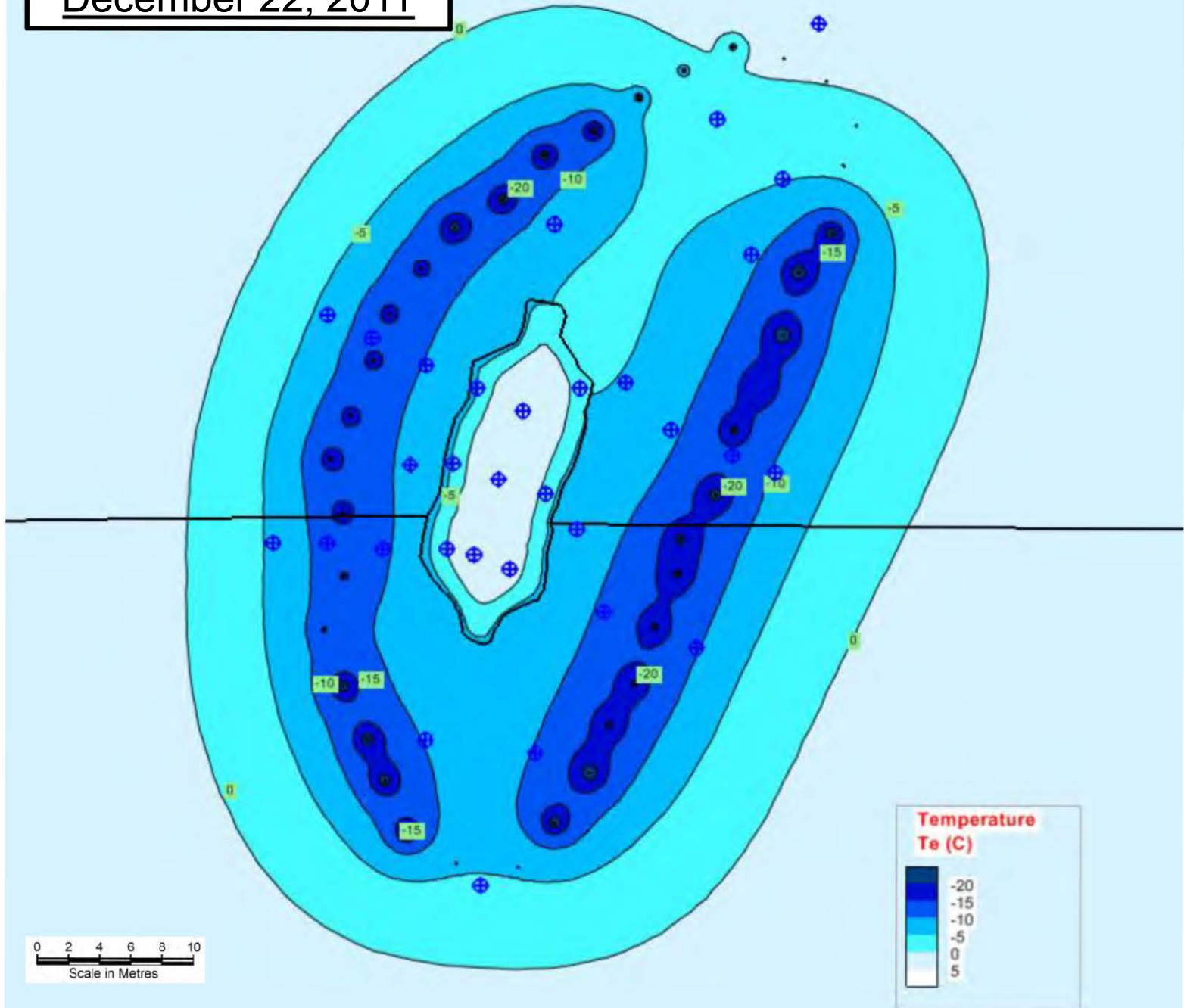
Group D – Two freeze pipes in parallel



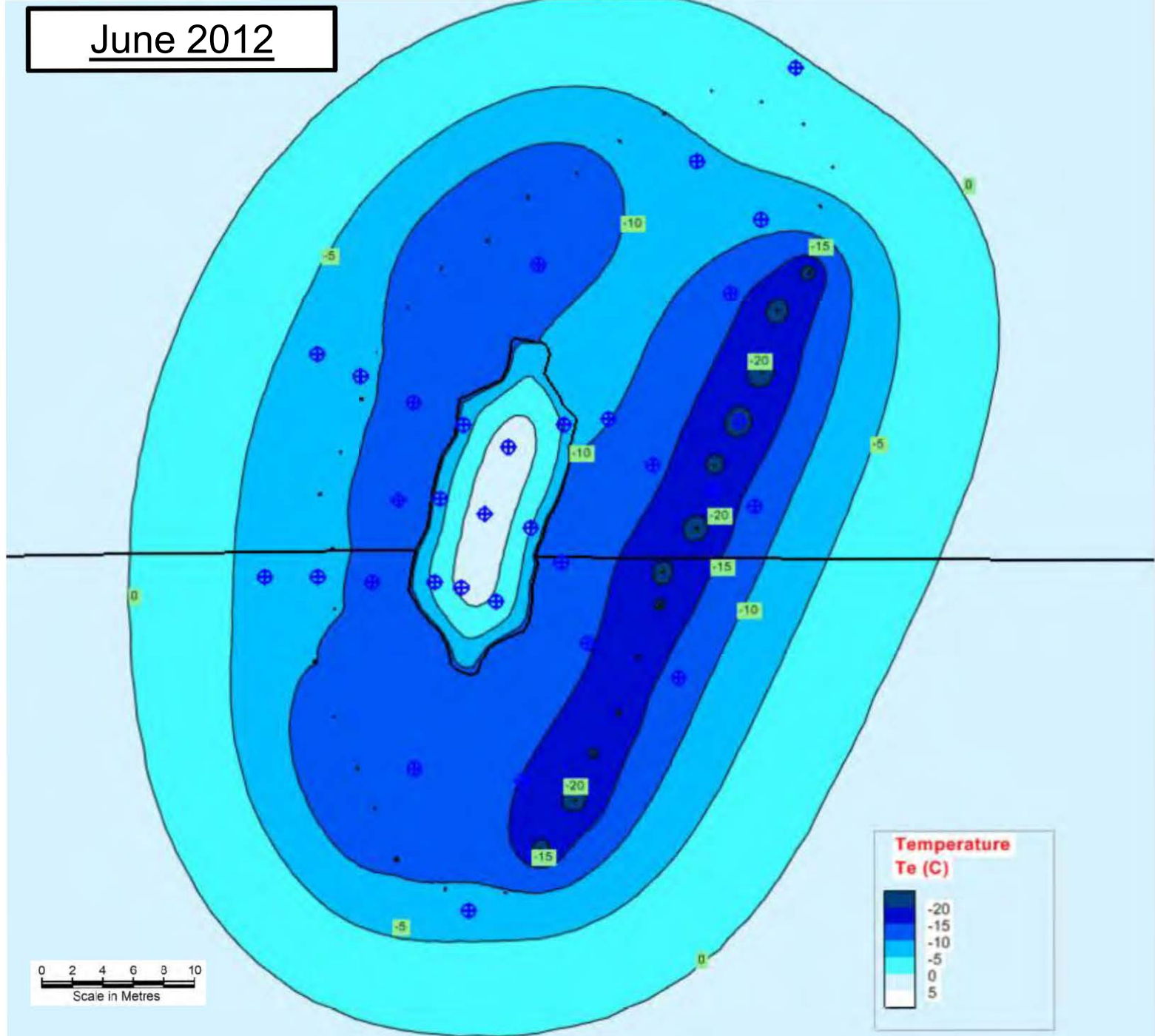
April 2011



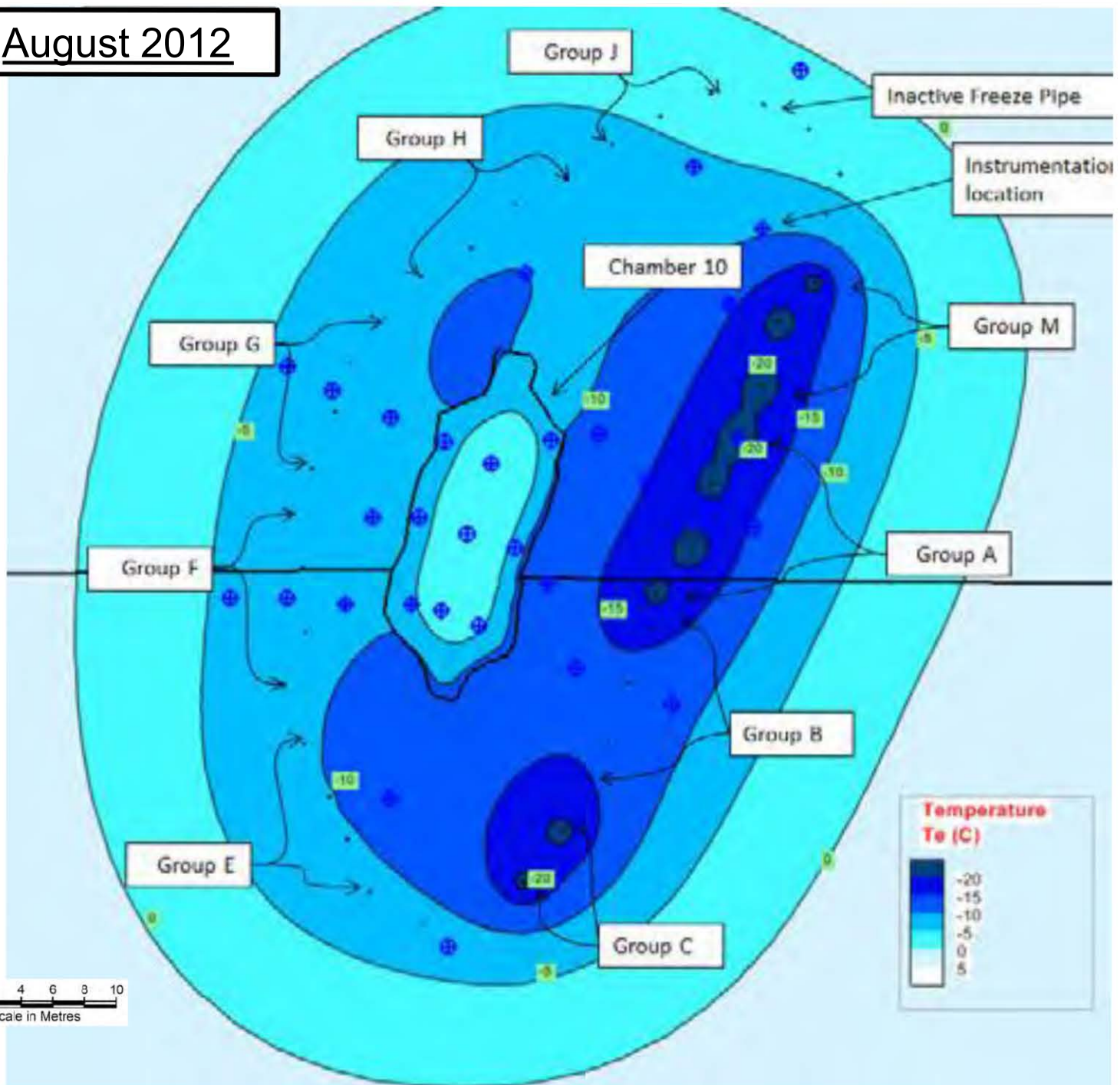
December 22, 2011



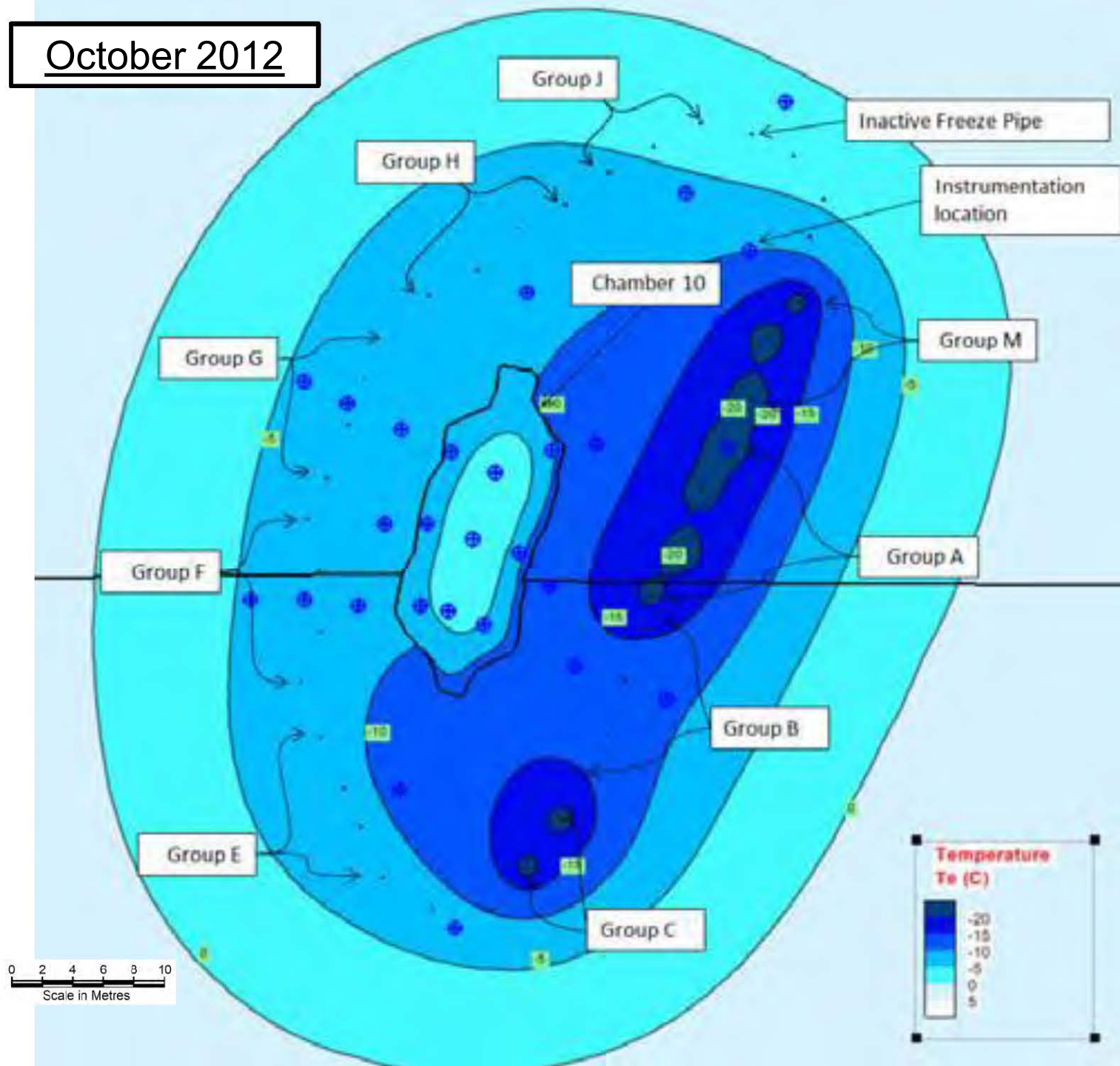
June 2012



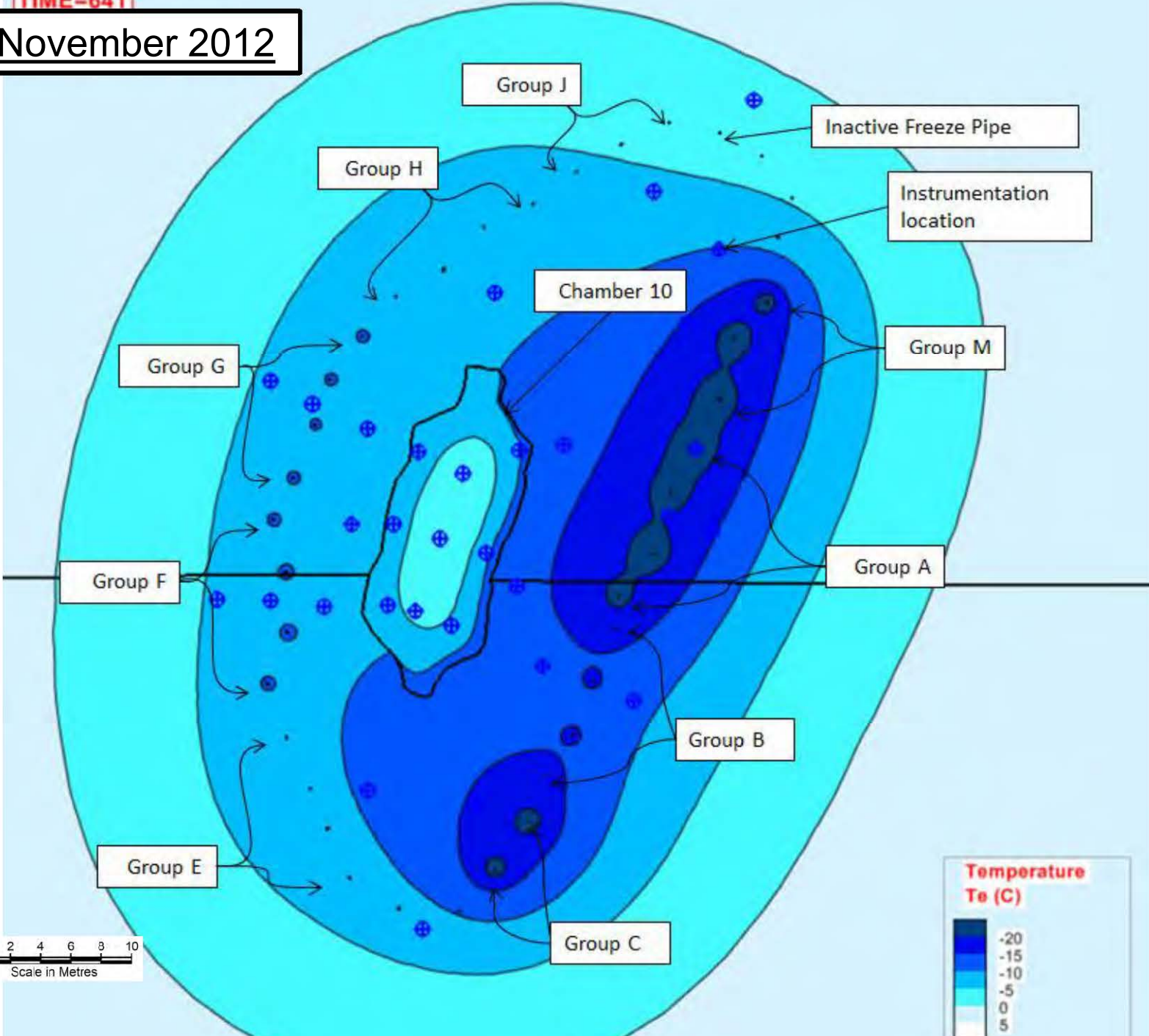
August 2012



October 2012



November 2012



DATA ANALYSIS UPDATE

- FOS results update report (2nd one)
 - Issued as draft in October
- Updates on the following topics:
 - Arsenic dust thermal properties
 - Plant power consumption & efficiency
 - Hybrid thermosyphon winter operation
 - Group E conversion

DATA ANALYSIS UPDATE

- Arsenic dust thermal properties
 - Chamber 10 dust appears to be quite dry
 - Less than 2% moisture
 - Estimates of thermal conductivity are within predicted range

DATA ANALYSIS UPDATE

- Plant power consumption & efficiency
 - Coefficient of performance (COP) is a common measure of refrigeration efficiency
 - Lower than expected from literature
 - Probably due to plants working at low end of their capacity

DATA ANALYSIS UPDATE

- Hybrid thermosyphon winter operation:
 - Passive operation contributed only about 5% to the overall freezing
 - Confirms that hybrid system are not likely to provide big savings in power cost
 - Their value is in the ease of conversion from short term freezing to long-term freeze maintenance

DATA ANALYSIS UPDATE

- Group E conversion
 - Simple (but costly) methods of conversion from active to passive have already been tested:
 - Hybrids
 - Thermosyphons installed inside active freeze pipes
 - Other methods
 - Cut off the active freeze pipe and add a thermosyphon radiator to the top
 - Build a thermosyphon with an active cooling jacket that can subsequently be removed

NEXT STEPS

- Trade-off studies
 - Schedule delays due to budget constraints
 - Q1 2013
 - First design the long-term freeze system
 - Long-term robustness will govern required spacing, number, location, and type of thermosyphons
 - Will also be able to use this design to evaluate long-term monitoring requirements
 - Return to other trade-off studies in Q2 2013
 - Monitoring analysis will also be then