

Cold Chain Solutions

Cold Shipper Trials



Creating a sensible cold-chain !

Objective

- To observe & record existing Packing standards.
- To confirm efficacy (Temperature Retention).
- To assess duration index of complete shipper.
- To assess weak links in cold chain.

- No changes made -
 - to packaging material.
 - to placement of chill packs.
 - to methodology or processes followed.

The Protocol

- Select one each of thermocol shippers.
- Load shippers with sample contents.
- Package per existing practices.
- Add gel packs (maintain 2 to 8 °C).
- Store shippers for 96 hours in ambient.
- Record temperature using data loggers.
- Open Shippers (13th Sept) and analyse records.

Equipment Used

- ✦ Thermocol Boxes (2 Nos)
- ✦ Chill Pack Freezer (1 Nos)
- ✦ Data-Loggers (6pcs, 3 per box)
- ✦ Chill Packs (15 nos, 300ml each)
- ✦ Spectral temperature sensor.



Shipper & contents



Temperature Recorders



Cold Packs – thermal charge

Trial Methodology



Package Prepared



Cold Packs' Temperature Checked



Cold Packs placed, Loggers Placed

Shipper Sealed



Trial Records

- Standard Thermocol Shipper loaded:
 - Two layers of product, total ___units - mass ___gms.
 - Bottom with 24 units, top layer with 16 units.
 - Cardboard spacer sheet used.
- Cold Packs used measured initial at -10 to -17.5 °C.
- Cold Packs were wrapped in plastic sheet.
- Cold Packs placed on one side of shipped cargo box.
 - Total 10 cold packs were placed (for 2 to 8 °C use).
- Temperature loggers placed next to product units.
 - One between product, one between outer wall and product.
 - Loggers programmed to measure every 5 mins.
- Shipper taped and strapped.
- Shipper placed on top floor (with ambient at 33.4 °C).

Two Boxes



Temp Datalogger

Cold Packs in Plastic Wrap

Temp Datalogger



- Large Thermocol Box**
- 40 _____ units
 - 10 cold packs
 - 2 Temp loggers (both inside)

- Small Thermocol Box**
- 1 litre bottle of water
 - 5 cold packs
 - 2 Temp loggers (1 in + 1 out)



Result - Synopsis

- Each Box took about 4 minutes to pack.
- Experiment commenced at 1620hrs, 09-Sept-10.
- Cold Packs ranged between -10 to -17° C.
- Ambient temperature measured at 33.4° C.
- Shipper external walls at 31.5° C.

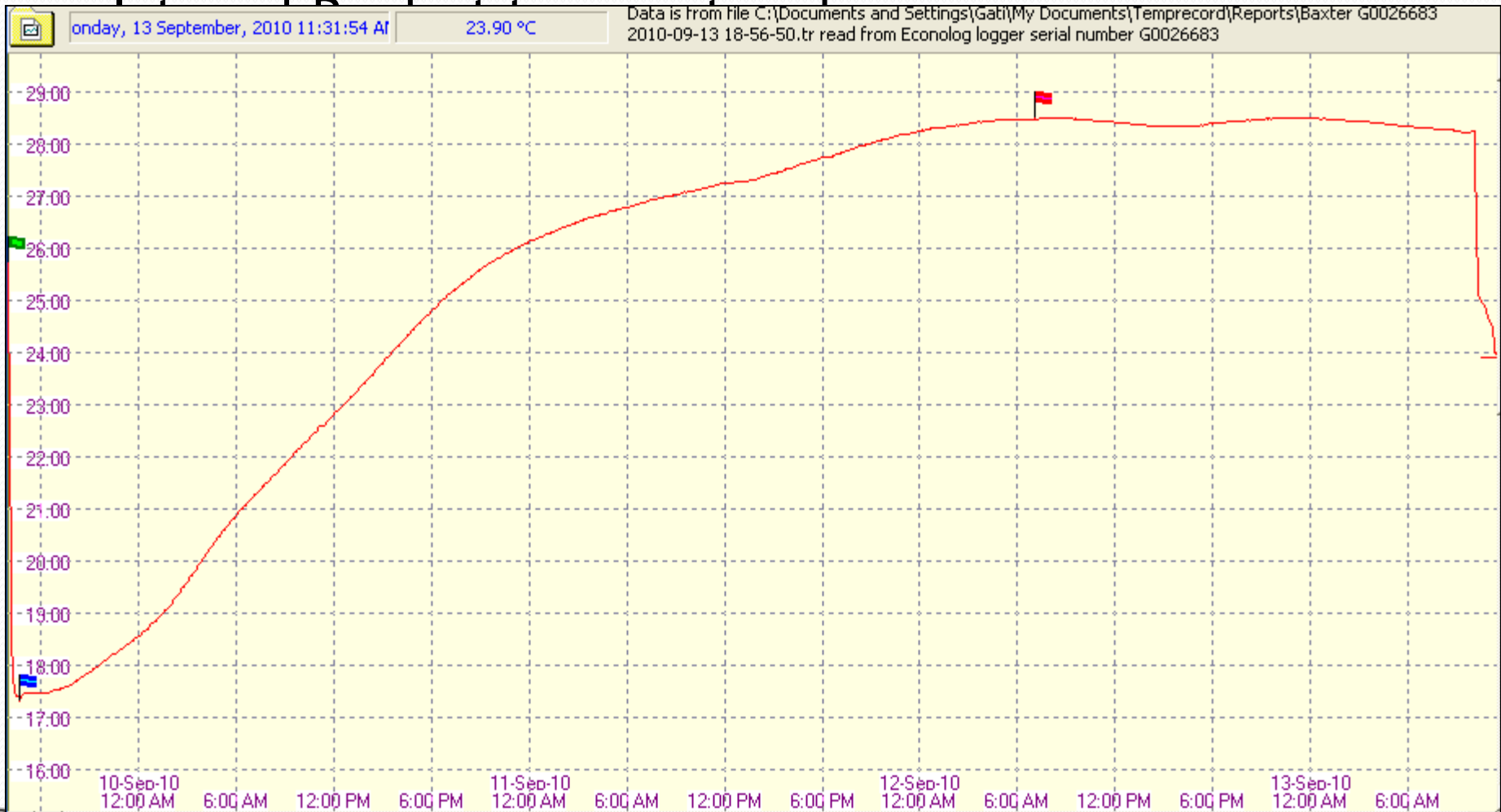
- Shippers were opened on 13-Sept-10.
- Internal temperatures exhibited a rising profile.
- Temperatures not maintained between 2 to 8° C.
- Box A- rose above 25° C in 26.8 hrs.
- Box B- rose above 25° C in 38.9 hrs.

Result-Analysis [A]

- Box A - 10 cold packs, ambient 33.4° C, 40 units:
 - Sensor 1: Internal temps between 20.8° C to 28.4° C.
 - Product >25° C after 10-Sep, 1841 hrs (26.8hrs)
 - Sensor 2: Internal temps between 17.3° C to 28.4° C.
 - Product >25° C after 11-Sep, 1123 hrs (43.4hrs)
 - No pull down to below 8 ° C experienced.
 - External ambient was between 26° C to 34° C.
 - +1100 temperature samples (12 every hour) recorded.
- Conclusion:
 - Box type & number of cold packs insufficient for intention.
 - With pre-cooled product, results would improve.
 - With harsher ambient, results would be worse.



Box A – Temp Graph

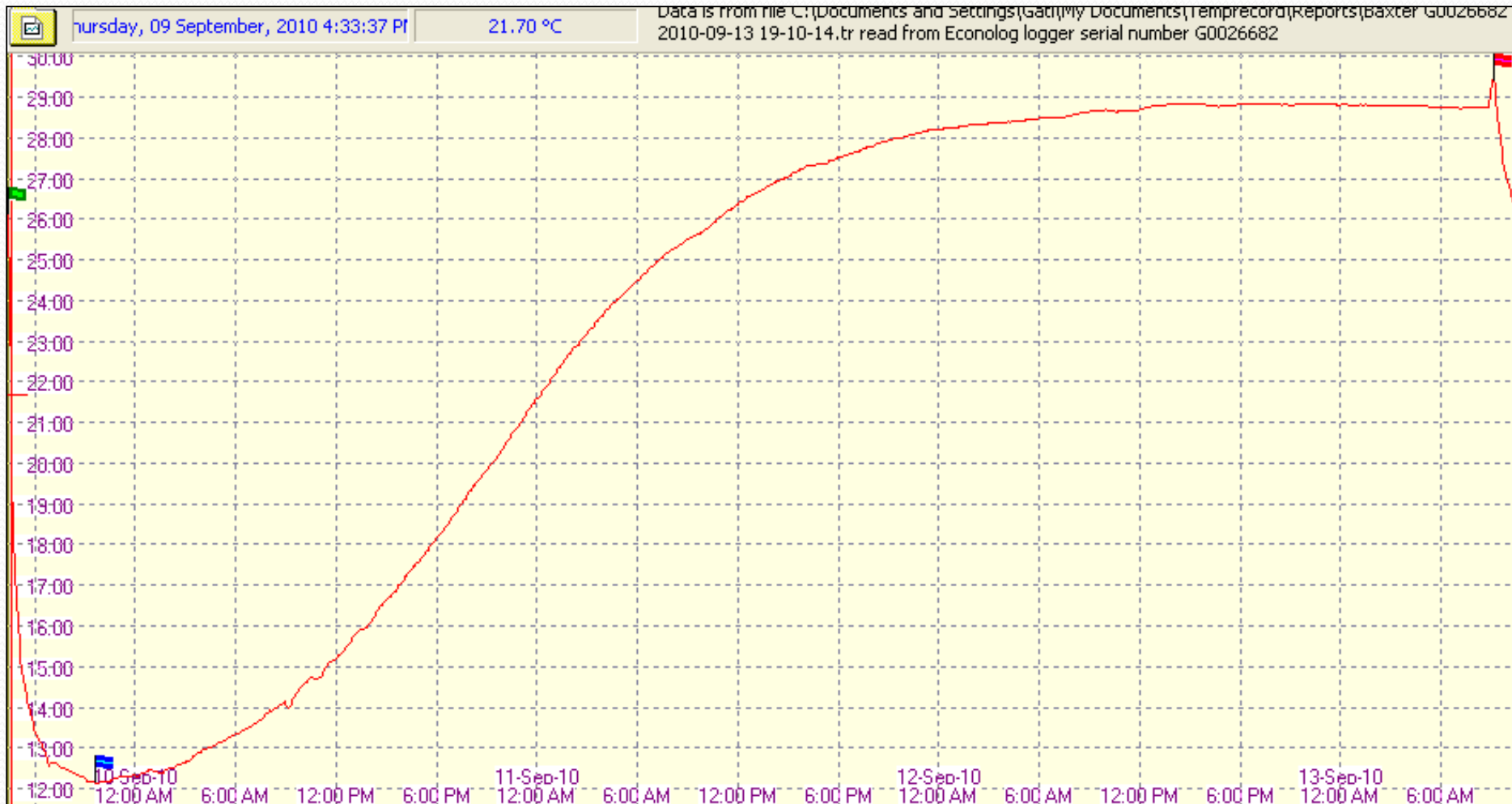


Result-Analysis [B]

- Box B - 5 cold packs, ambient $<30^{\circ}\text{C}$, 1 ltr water:
 - Sensor 1: Internal temps between 12.1°C to 28.7°C .
 - Product $>25^{\circ}\text{C}$ after 11-Sep, 0718hrs (39.3hrs)
 - Sensor 2: External temps between 25.7°C to 29.3°C .
 - No pull down to below 8°C experienced.
 - +1100 temperature samples (12 every hour) recorded.
- Conclusion:
 - Box type & number of cold packs insufficient.
 - With pre-cooled product, results would improve.
 - With harsher ambient, results would be worse.



Box B – Temp Graph



Result Summary

- Regular validation of efficacy is required.
- Thermocol shipper specifications [insulation grade] suspect.
- Cold packs mass and numbers used insufficient.
- Ineffective placement of cold packs - new packaging method to be validated.
- Regular checks in hot oven and real time to be deployed.
- Pre-qualification of design and process required.
- Effective cold chain integrity is inconclusive.

Improve your Cold chain Integrity



Creating a sensible cold-chain !