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Applying Real – Time Biological Testing to Monitor Drying Efforts of Category 1 Water Loss

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STUDY OBJECTIVES

- Can finished building materials impacted by Category 1 water be restored if addressed within 24 hours of the event?
- Should attempts to dry or restore the finished building materials be implemented after 24 hours of a water loss discovery?
- If VMG is not present on the finished building materials, should drying continue for longer than 72 hours of the event?
- When does the project move from restoration to remediation of the water impacted building materials?
- Can biocides be appropriately introduced into the drying process to allow for the drying to continue beyond the 72 hour threshold?

What is Category 1 water?

- The IICRC S500 defines Category 1 water “Clean Water” as, “Clean water originates from a source that does not pose substantial harm to humans. Examples of clean water sources may include, but are not necessarily limited to, broken supply water lines, tub or sink overflows with no contaminants, appliance malfunctions involving supply water lines, melting ice or snow, falling rainwater, broken toilet tanks and toilet bowls that do not contain contaminants or additives.”

Purpose of Drying

- Purpose of drying is to remove the excess water from impacted area (extraction, demo, pumping, etc.).

- Perform drying of the restorable building materials and structure to eliminate the potential for growth of bacteria and fungi on the water impacted building materials.

It Happens…

Very Wet

What is meant by “Real Time?”

- Real time biological testing is the collection and measurement of biological contaminants within seconds or minutes.
- Surface, Air, Bulk, or Liquid Sample Types

The Technology and Background

- Using (ATP bioluminescence) as a bio “Marker” or means of total bio-burden measurement (hyphae-fungi, bacteria, bio-films, etc.).
- Adenosine Tri-Phosphate (ATP) is present in ALL living organic material or cells.
- Converts biological contamination or presence into numerical values for interpretation.

Technology….How it Works

- ADENOSINE TRI-PHOSPHATE
- Fire Fly enzyme - use ATP to produce LIGHT
- The enzyme used is LUCIFERIN LUCIFERASE

LUCIFERIN LUCIFERASE

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ATP (contaminant)

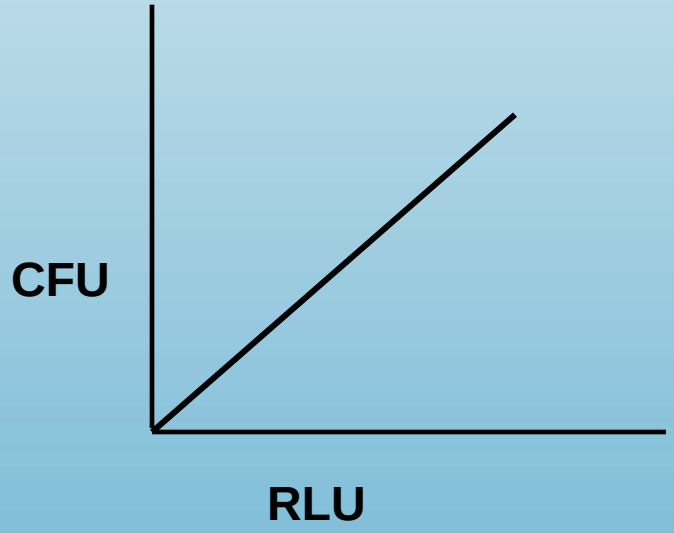
The reaction is called BIOLUMINESCENCE and is measured in RELATIVE LIGHT UNITS (RLU) – ATP reactions are efficient 1:1 bio to light production.

Technology and Background

- Bioluminescence testing allows for the following:
  - Easy, rapid method of assessing the total biological presence on a surface or in a liquid
  - Results available in under 1 minute (*Real time*)
  - Allows for detection of non-culturable material
  - Tests are easy to perform (*no specific skills or formal training are required*)

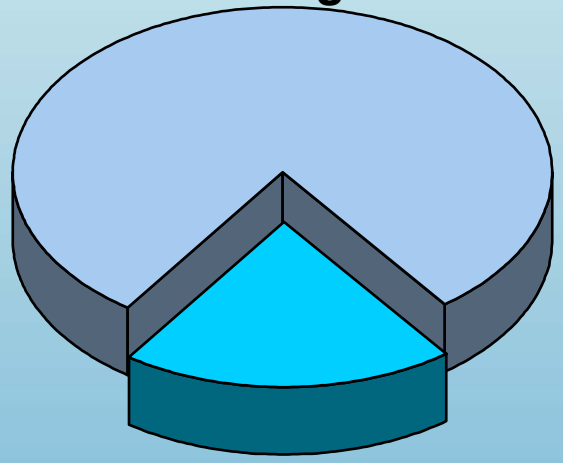
Technology and Background

CFU / ATP correlation



With pure culture of micro-organisms, without other residues, RLUs correlate well with CFUs (ie: bacteria)

Other Biological ATP



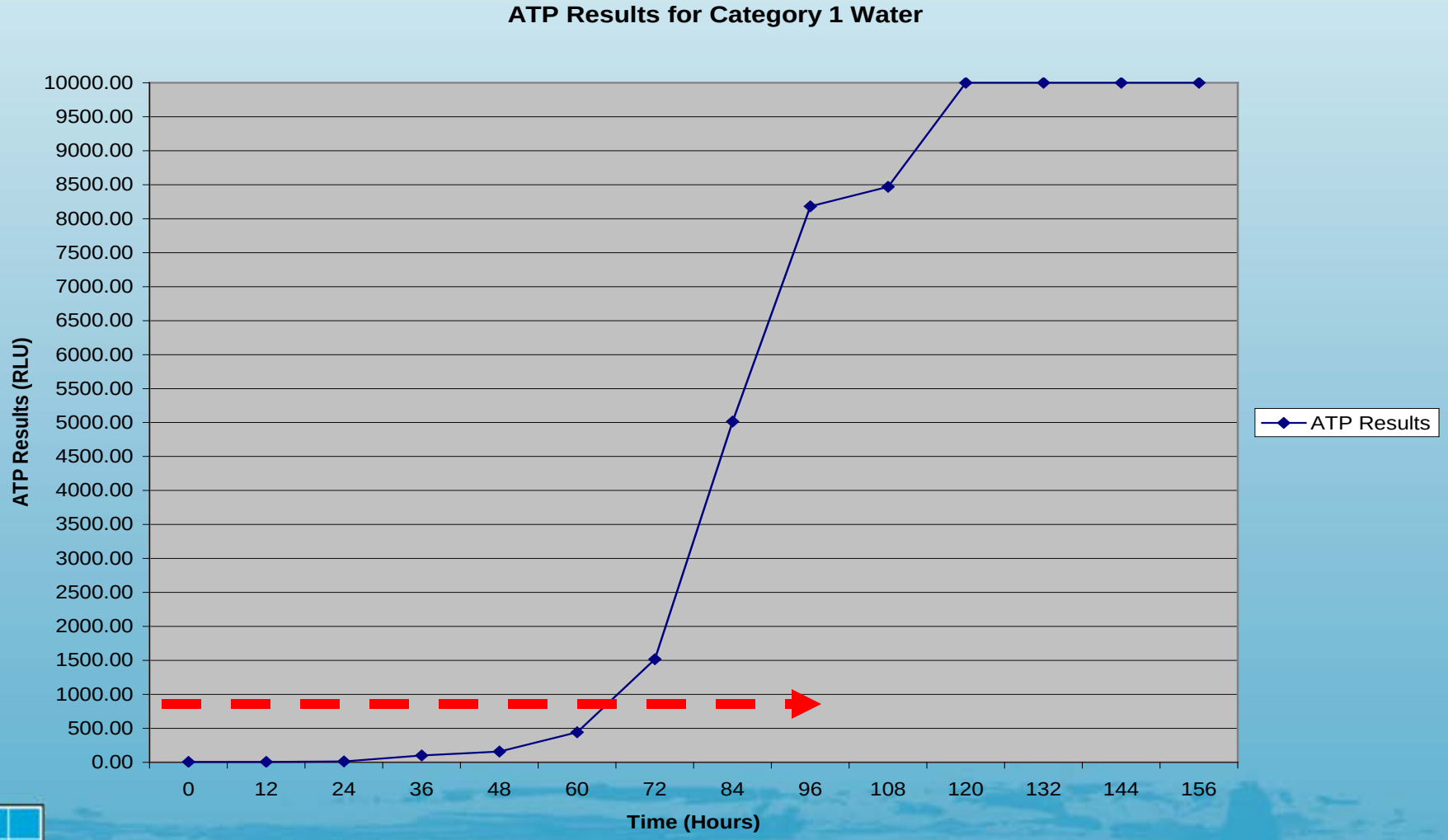
With these typical proportions of ATP, RLU does not correlate with CFU but with total biological presence (typical environment)

TEST METHOD

- Small wall section was constructed with studs and painted gypsum board.
- Wall was lowered into a tub with Cat 1 water (tap water).
- ATP samples were collected every 12 hours.
- Moisture content - >15% after “loss”
- Samples collected over seven day period-VG began between day 5-7.

Equipment Used – Bio-reveal

TESTING RESULTS



Case Study

8,124 RLU

(4 days after loss)

Base of Wall - Condo

2,224 RLU

(5 days after loss)

CONCLUSIONS

- Gypsum board did not have significant bio-contamination background present (less than 20 RLUs)

- Wood framing did not have significant bio-contamination background present. (less than 30 RLUs)

CONCLUSIONS

Q: Can finished building materials impacted by Category 1 water be restored if addressed within or before 24 hours of the event?

A: YES – If excess water is removed and specific drying of impacted materials is implemented successfully between 36 and 48 hours

CONCLUSIONS

Q: Should attempts to dry or restore the finished building materials be implemented after 24 hours of a water loss discovery?

A: YES – If aggressive restoration and drying measures are implemented (more equip & personnel) – only 24 hours left for drying to be completed.

CONCLUSIONS

Q: If VMG is not present on the finished building materials, should drying continue for longer than 72 hours of the event?

A: NO – Bioamplification begins to accelerate significantly at this time threshold. Also, drying process could negatively impact IAQ – aggressive air movement.

CONCLUSIONS

Q: When does the project move from restoration to remediation of the water impacted building materials?

A: Approximately 60 hours after the initial water loss event. After 60 hours and approaching 72 hours and beyond bioburden of impacted material is significant - restoration drying of the finished materials would likely not improve the biological status of those materials .

CONCLUSIONS

Q: Can biocides be appropriately introduced into the drying process to allow the drying to continue beyond the 72 hour threshold?

A: YES - Introduce biocide between 36 and 54 hours after the initial event – after 60 or 72 hours may be ineffective if substantial bioamplification is established.

CONCLUSIONS

- Using ATP testing to evaluate drying of Category 1 water loss appears to be a good method in understanding the potential for bioamplification after a water loss event.
- Measuring bioburden and moisture allows the restoration work to proceed along a logical path to success.
- Measuring bioburden of drying efforts allows for appropriate decisions to be made to best serve the customer, insurance provider and restorer.

Thank you

Thank you for attending this presentation.

ANY QUESTIONS??