2024 SIGHT

Oxygen Reduction at the Arcapita Bank Data Centre

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Introduction

- 2024Sight
  - Independent and innovative Information and Communications Technology (ICT) consultancy
  - Works with developers of real estate, public infrastructure and industrial facilities
  - Advises on ICT related challenges during the concept design stages of projects
  - Accompanies the project through the development life-cycle

- 2024Sight *(read 20-20-Foresight)* is about clarity of your information and communications technology planning and having control over your technology future

2024Sight Experience

Data Protection

- Data is at the core of your business

> *Loss of IT is seen as highest business continuity risk by 71% of managers, followed by loss of telecommunications (59%) and loss of people (54%).*

BCM Report 2009, UK

- Loss of data causes
  - Hardware failure
  - IT system errors
  - Flooding
  - Fire

- Prevention and/or recovery measures can be implemented for all

Focus of this presentation is fire prevention measures in the Arcapita Bank Data Centre

Arcapita Bank Data Centre

- Floor size approximately 100m^2
- Fully remotely monitored, controlled and managed
- Densely packed with gross floor area per rack of just over 3m^2
- Equipped with a mixture of normal 42” racks and fault-tolerant high-density racks each of which can handle 10 to 14 kW of installed systems capacity, i.e. heat is a major issue
- Protected by Oxygen Reduction (at 14.6% oxygen) and Aspiration Smoke Detection

Reasons for Oxygen Reduction and ASD

- Environmental Arguments

- Prevention versus Suppression
  - The 3 Components of Fire
  - Measurable Certainty
  - Time

Environmental Arguments

- 2024Sight view: use of man-made gas for fire protection is at risk of being banned in the longer-term
  - CFC (Chloro-Fluor-Carbon gasses), e.g. Halon, already internationally banned
  - FM200 (Hepta-Fluor-Propane gasses), already banned in the Germany; other countries are expected to follow

- Strategic decision to use natural gasses
  - Oxygen reduction relies on enriching the data centre atmosphere with Nitrogen, which is 79.9% of today's atmosphere
  - Very likely to be a future proof solution

Prevention versus Suppression

3 Components of Fire

- Combustible material
- Heat
- Oxygen

- Prevention
  - By sufficiently reducing one of the three components of fire, namely oxygen down below 15%, a fire can simply not happen
  - Without the oxygen only combustible material and heat remain

- Suppression
  - Gasses which are released when the fire has broken out (and has been detected) is like locking the stable doors after the horse has bolted.
    - You are too late, you have a fire and the damage is done

Prevention versus Suppression

Measurable Certainty

- Prevention
  - As long as the oxygen levels are maintained at 14.6% you know:
    - That your prevention systems are working
    - That the integrity of your data centre is intact because it is being “tested” continuously
    - That no fire can arise

- Suppression
  - With suppression systems you can only hope:
    - That they will work when they should (despite regular testing and maintenance)
    - That your data centre is sufficiently intact to maintain the required concentrations of fire suppressants (even with the best maintenance procedures and test regularly) and that there are no unaccounted breaches through which suppressants leak away
    - That not all your equipment gets damaged
  - You only find out whether it really works once the incident has occurred

Prevention versus Suppression

Time

- Prevention
  - The Aspiration Smoke Detection (installed throughout the data centre and the surrounding support areas) will pick up heat generated particles at the very early stages of a heat issue developing
  - Support staff have time to look for and eliminate the source of the heat - because of oxygen reduction no fire can arise
  - Damage and down time of servers and services can mostly be avoided

- Suppression
  - With suppression systems you will not have to search for the heat issue, because that is where the fire is
  - Even with the release of the suppressants, you have no choice but to shutdown large parts (if not all of your infrastructure)
    - To eliminate the heat issue
    - To avoid further damage
    - To prevent the fire from recurring after the suppressants have dispersed

Things to Watch Out For

- Health and Safety Regulations
  - 14.6% Oxygen is safe, equivalent to living at a height of 3000m
  - Staff needs to be checked periodically, especially if there is a history of blood disorders
  - Special procedures have to be implemented for staff working in an oxygen reduced environment (but remote control is better)

- Design & Build
  - Oxygen reduced (and in fact even areas protected by fire suppression systems) need to be gas tight and need to have special doors and cabling pass-throughs
  - Requirements of the Oxygen Reduction System need to be taken into account, including such things are air supply and enriched oxygen air exhaust

- Planning and Foresight
  - Implementing Oxygen Reduction is not an afterthought