

## CASE STUDY:

# Gas fire suppression helps to safeguard millions of national artefacts



Customer:  
**Automatic Protection Limited**

Region:  
**UK**

Project Name:  
**Nuclear and Caithness Archives (Nucleus)**

Product Solutions:  
**LPG INERGEN iFLOW Fire Suppression System  
IG-541 gas cylinders, nozzles and pipework**

## Profile

Automatic Protection Limited (APL) was formed in 2001 by father and son team, Neil and Stuart Harrison. Based in the Scottish border town of Biggar, South Lanarkshire, APL has more than 45 years' experience in the fire and security industry. It is a recognised expert in automatic fire extinguishing and suppression systems, specialising in gaseous fire suppression.

## Scope of works

Created in 2004, the UK Government's Nuclear Decommissioning Authority (NDA) was tasked to safely wind up the UK's 17 nuclear sites.

As a result of its decommissioning work, the NDA had the problem of what to do with millions of important nuclear records, plans, photographs, drawings and other documents – some going back to the 16th century.

It was an enormous challenge. Records from the Dounraey nuclear site alone include almost a third of a million photographs and 200 tonnes of document, while the Sellafield site has more than 80,000 boxes of archived records that would stretch for 120km if laid end to end.

Many of the documents will have to be securely stored and accessible for hundreds of years so the NDA has built an ultra-modern facility called Nuclear and Caithness Archives (Nucleus).

"The people we work with in Johnson Controls are experts in the fire suppression industry and can be relied on to help with design problems and provide solutions to any issues with particular sites. Their expansive industry experience is instantly accessible with a quick phone call."

Stuart Harrison,  
MD, Automatic Protection Limited



## Profiled project

Located in Wick, near the former Dounraey site, the striking Nucleus building includes eight rooms, or repositories, with 24km of shelving. A major challenge was to install a suppression system that would deal with fires but not damage the valuable and sensitive artefacts.

Water-based sprinkler systems were inappropriate and so a gas-based installation was required. The main building contractor, Morrison Construction, had tasked Wick-based G & A Barnie with the contract for electrical and engineering works and, in turn, the company selected APL for fire suppression services.

A tier one distributor for Johnson Controls International (JCI), APL contacted its long-term partner to assist with design work and provide vital equipment that would help protect the archive.

"We started using Johnson Controls exclusively in 2006 and we have done so ever since," said APL managing director, Stuart Harrison.

"Its equipment is the best and most reliable in the UK market and it has a very good name in the industry."

Installed by APL, the Nucleus solution from JCI includes 60 gas cylinders and features the state-of-the-art LPG INERGEN iFLOW delivery system. This provides a regulated and effective discharge of inert gas that is colourless and odourless, safe for people and the environment and causes no damage to property.

The LPG INERGEN iFLOW system delivers IG-541 which is a combination of 52% Nitrogen, 40% Argon and 8% CO<sub>2</sub>. This was specifically chosen for Nucleus because it reduces oxygen to approximately 11% – significantly below the 15% level that extinguishes fire and well above the safe oxygen levels required by personnel.

The gas is distributed by 114 nozzles including 180-degree delivery models situated near walls and 360-degree versions located in the centre of rooms. Automatic warning alarms enable evacuation.

### Benefits at a Glance

- Between £60,000 and £70,000 saved on pipework
- Considerable reduction in implementation time and space
- Industry standard non-invasive protection for invaluable national artefacts





The iFLOW selector valves are calibrated to send the right amount of gas to wherever the fire is burning and it is the design of the delivery pipework that sets the Nucleus installation apart. More traditional designs would site all eight selector valves alongside the remotely positioned gas storage cylinders, requiring eight pipe runs to take the gas to each room. APL has positioned individual valves outside each room, all feeding off just one run of pipework.

### Benefits

"We estimate that the decision to locate selector valves outside each room has saved the NDA between £60,000 and £70,000 in pipework alone," said Harrison.

"Using just one pipe run rather than eight has also reduced implementation time and space because with a sprinkler system you may be looking at a large tank and lots of pipework. As well as eliminating water damage to the artefacts, gas is also safe to personnel and leaves no residue."

Only naturally occurring gases are used. They do not create any fogging which could obscure escape routes and they do not damage the environment.

The iFLOW installation also eliminates peak discharge pressure problems by regulating the flow at a nominal pressure of 60 bar in the 300 bar system or 40 bar in the 200 bar version. Maintaining this constant pressure removes the need for significant pressure relief solutions and the associated installation time and cost.

Retrieving, collating and transferring all the records to Nucleus will take five years and on completion this will be one of the largest accredited repositories outside London.

Already the recipient of design and architecture awards, the building will be used for education and has a large public area. Using JCI fire suppression solutions for this nationally significant project ensures that its irreplaceable artefacts will be safeguarded for many future generations.

Johnson Controls is a global diversified technology and multi industrial leader serving a wide range of customers in more than 150 countries. Our 117,000 employees create intelligent buildings, efficient energy solutions, integrated infrastructure and next generation transportation systems that work seamlessly together to deliver on the promise of smart cities and communities.

Our commitment to sustainability dates back to our roots in 1885, with the invention of the first electric room thermostat. We are committed to helping our customers win and creating greater value for all of our stakeholders through strategic focus on our buildings and energy growth platforms.

For additional information, please visit [www.johnsoncontrols.com](http://www.johnsoncontrols.com) or follow us @johnsoncontrols on Twitter.

Parts displayed are for visual representation only. Actual products may vary. iFLOW is a mark and/or registered mark of Johnson Controls. Unauthorised use is strictly prohibited. © 2018 Johnson Controls. All rights reserved.