

The development of an Integrated Site System for the detection of illicit trafficking of radioactive and nuclear materials

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General Introduction



Project Services

- About us
- Introduction to Project (Role of Project Services)
- Supplier Assessment
- Development of Specification
- System Components
 - Vehicle Monitors
 - Pedestrian Monitors
 - Handheld Monitors
 - Number Plate Recognition
- Alarm Response
- Summary

About us



Project Services

- Part of of British Nuclear Fuels Limited (BNFL)
- Highly qualified specialists across a range of scientific, technical and engineering disciplines including:
 - Project Management and Nuclear Engineering / Decommissioning
 - Environmental and Waste Management
 - CBRN
 - Services and Instrumentation (S&I)
- Specialists in providing integrated radiometric detection and measurement systems
- 50 years international nuclear experience
- Over 800 staff



Introduction



Project Services

- **Global Partnership – International Collaboration aimed at improving national and global security**
- **Project Services - Project Management for nuclear security projects portfolio**
 - **Preventing sabotage and theft of radioactive materials**
 - **Reducing vulnerability to and consequences of terrorist activity**
 - **Promoting sustainability of security enhancements to ensure long-term effectiveness**
- **Project Services has designed, installed and commissioned a radiation detection system to monitor vehicles and personnel movements at a major nuclear licensed site**

Assessment of Suppliers



Project Services

- **Project initiated in 2003 by the Site Head of Safeguards, Security and International Affairs**
- **Collaboration between Project Services, IAEA and experts from the UK to define requirements**
- **Fundamental Principle: “Wherever possible use commercially available equipment” to minimise cost and risk**
- **Considered equipment suppliers from UK, Europe, USA and FSU**
- **Considered performance, previous experience and support infrastructure**
- **Identified shortlist of suppliers**
- **Project Services awarded contract to supply, integrate, install and commission the systems to meet site security requirements**

Development of Specification



Project Services

- **Discussions with client, key stakeholders, HM Revenue & Customs and UK Home Office**
- **Identified quantities of materials to be detected from Threat Assessment**
- **Consideration of background levels, environmental considerations etc.**
- **Consideration of permissible false alarm rates**
- **Inclusion of non-SNM radioactive materials**
- **Review of vehicle / pedestrian traffic levels to determine throughput**
- **Collaboration with preferred suppliers to tailor systems to meet requirements of client**
- **Integration of separate commercial systems into a single site wide perimeter monitoring system**

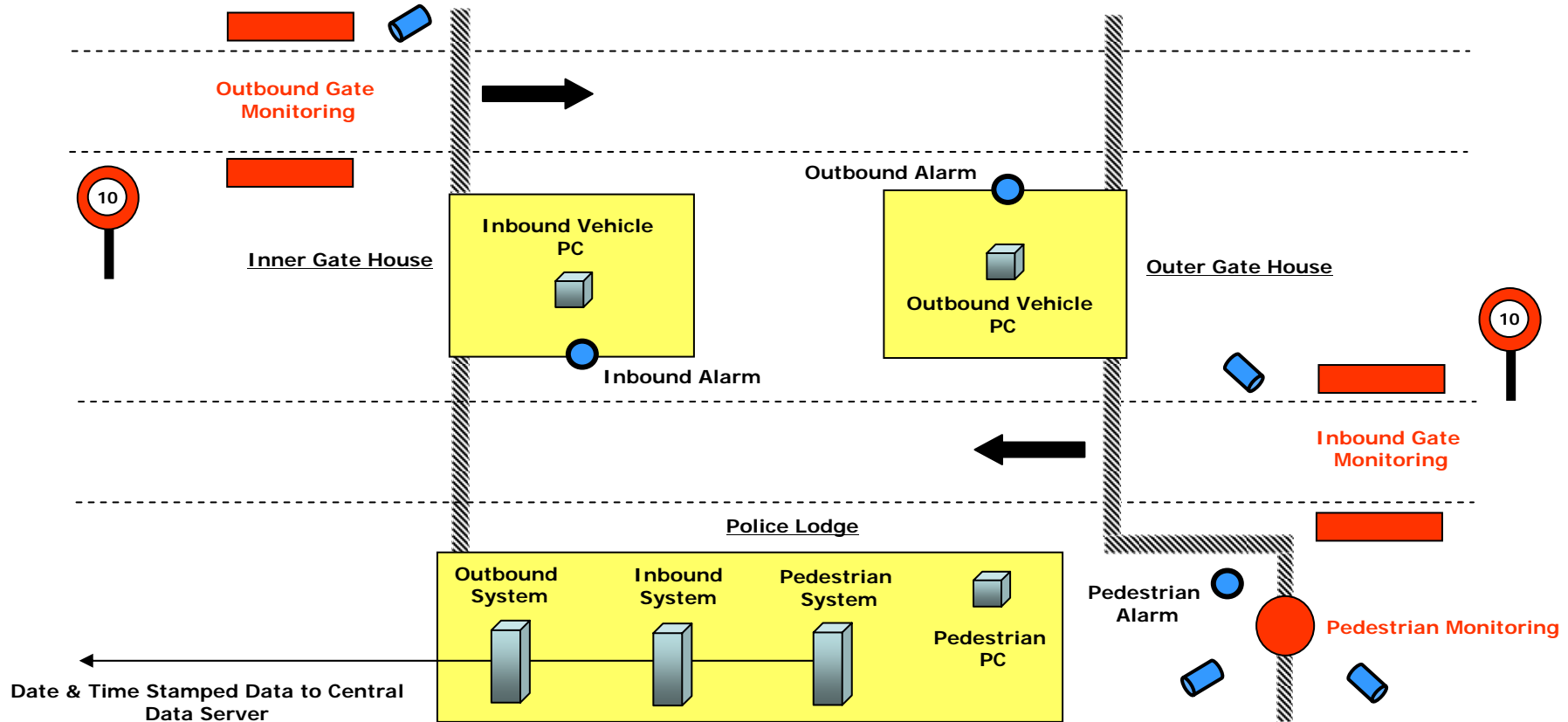
Identified System Needs



Project Services

- **Inbound and Outbound Vehicle Monitoring Systems**
- **Inbound and Outbound Pedestrian Monitoring Systems**
- **Handheld Radioisotope Identifier Systems**
- **Automatic Number Plate Recognition Systems**
- **Centralised database systems to collate data from each system**
- **Construction – road furniture, barriers, turnstiles, access control systems**

Generic Gate Layout



Vehicle Monitors


- Gamma (PVT) and neutron based (He-3) detection system
- Vehicle speeds up to 20 mph (30 kph) to be monitored
- Up to 60,000 vehicles / week
- Up to 4m wide and 4m tall vehicles
- Discrimination against NORM based on radiation energy and distribution
- Colour CCTV and source image of vehicle produced
- Local storage of images and radiation data for all vehicles
- Alarm Data sent to central database server for archiving / evidence



Result

contamination high

neutron alarm !



front 00 sec back

measurement time 16.01.05 14:21:36

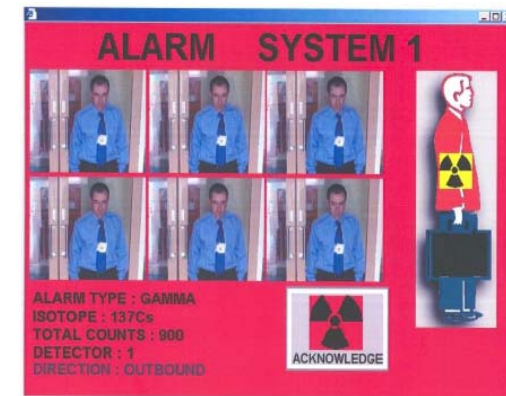
speed [km/h] 0.00

accept

gamma		neutron	
max net [cp/g]	max net [cp/g]	max net [cp/g]	
ch 0	0.00	ch 5	0.00
ch 1	0.00	ch 7	0.00
ch 2	0.00	ch 8	0.00
ch 3	0.00	ch 9	0.00
ch 4	0.00	ch 10	0.00
		ch 11	0.00
		ch 0	23.10
		ch 1	11.55
		ch 2	11.55

Pedestrian Monitors

- Gamma (Csl) and neutron based (He-3) detection system
- Bi-directional measurement as pedestrian approaches turnstile
- Turnstile locked if radiation source detected (person is not detained)
- Integrated CCTV / digital video captures image of person
- Isotope identification and discrimination against medical isotopes
- Local storage of image and radiation data
- Alarm Data sent to central database server for archiving / evidence



Handheld Monitors



Project Services

- **First stage of investigation of alarms – Guard Force will detain/release person/vehicle based on this system**
- **Neutron and gamma radioisotope identification**
- **Provides rapid dose measurement for source localisation**
- **Longer duration measurement available to identify source material and type (SNM, Industrial, Medical, NORM)**
- **Data download to central database is linked with originating alarms data from portals**
- **Docking station houses standardisation source to maintain system calibration**



Vehicle Number Plate Recognition



Project Services

- Inbound and Outbound cameras at each vehicle gate
- ANPR cameras for vehicle number plate recognition
- Colour cameras to provide image of vehicle allowing operator to identify make, model and colour
- Number plates compared to authorised vehicle database and “watch” list
- Guard Force to know which vehicles are currently on site at any given time
- Access can be denied if vehicle is on “blacklist”
- Temporary access vehicles (deliveries etc.) that overstay their allocated times can be identified



Alarm Response

- Procedure developed with client, Guard Force, HP&S
- Multiple stages involving different teams:
 - Portal monitors operated by Site Owner
 - 1st Stage investigation using handheld monitors to confirm radiation present, localise and identify sources
 - 2nd Stage investigation by health physics to provide better information on dose rates, contamination levels, source recovery etc.
 - 3rd Stage investigation by Project Services to provide detailed information regarding characterisation and quantification

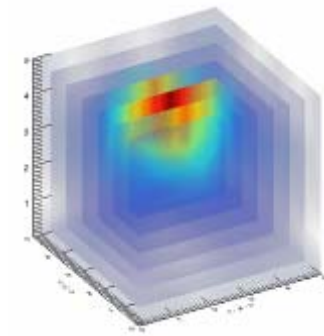


Characterisation & Quantification



Project Services

- ‘State-of-the-art’ radiometric equipment and analysis software
- Discovered materials to be either repatriated or disposed of
- Project Services under contract with UK Home Office / HMRC
- Provision of nuclear material characterisation at ports & airports
- Quick response teams (24 hour call-out) provide radioisotope identification and quantification



Summary (1)



Project Services

- **Site perimeter security is provided by a fully integrated system comprising:**
 - **Vehicle Radiation Monitoring**
 - **Pedestrian Radiation Monitoring**
 - **Handheld Radioisotope identifiers**
 - **Vehicle Number plate recognition**
- **Optimum system for client ensured by:**
 - **Determination of the most appropriate commercially available systems**
 - **Project Services specification and enhancement of standard systems to meet specific needs of client**
- **Response procedures developed that provide a structured methodology for investigating alarms at the portals**

Summary (2)



Project Services

- **Provision of Project Services 3rd Stage response function to perform specialist investigations to further assess, characterise and quantify any radioactive sources**
- **Project Services have worked closely with the Guard Force to ensure response plans that are specifically tailored for the facility, ensuring minimal disruption to the site operations**
- **This example shows how Project Services could provide such systems to specific sites, country borders, national and international events etc. to form a defence against trafficking of radioactive materials**

..... **Finally**



Project Services

- **Thank you for listening**
- **Please visit us on our exhibition stand for further information**



www.projectservices.com
www.bilsolutions.co.uk