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ASAP V Postal Room Overview

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The ASAP V Multi-Threat Infrastructure Monitoring System is a flexible counter-terrorism tool that can be used in a variety of locations ranging from postal rooms to airports and bus, train, and subway stations. It allows users to select which threats are monitored for, and to implement only those features currently needed. In many cases the systems can be upgraded to include additional monitoring capabilities as the threat situation changes or as additional funds become available. Current ASAP V capabilities include:

- Biodetection and bio-identification
- Chemical detection
- Explosives detection
- Radiation detection/identification
- Visual detection (Visible or thermal IR imaging)

To meet the detection needs for each category, detection products from the best counter-terrorism companies in the world are integrated by Research International into a system solution that is controlled by custom ASAP Sentry™ software residing on a monitoring PC.

For postal room applications a typical system is configured as shown schematically in Figure 1. Incoming postal articles are first taken from the dock and transferred into a sealed room constructed of Lexan™ plastic which is operated at a negative differential pressure. They are then shaken (jogged) over a downdraft table operating at 30,000 LPM. A downdraft table draws air in through a perforated metal top and exhausts it through a combination HEPA/activated carbon filter to an area outside the negative pressure room. The exhaust filter ensures minimum exposure of personnel outside the negative pressure room to any dangerous aerosols or gases found in the postal articles.

Air entering the negative pressure room is also filtered through a HEPA filter. If the room was not supplied with filtered air, it has been our experience that it becomes very dirty and personnel are reluctant to work there. If incoming air is filtered, even workers with breathing ailments prefer to work in the room as it alleviates their symptoms. RI's downdraft table licensor owns the U.S. patent on the design and use of downdraft tables for postal processing, and vigorously protects this intellectual property.

As the air is drawn past the postal article, vapors and particulates are captured in the airstream and carried into the table. A proprietary sampling manifold embedded in the downdraft table collects about 1% of the air stream and delivers this is to an air sampling device. This custom manifold is designed to sample every square inch of surface area. Just prior to the air being pulled into the primary air sampler, two isokinetic probes direct a portion of the sampled air to the chemical and explosives detectors for analysis. Following analysis, these secondary air streams are returned to the main exhaust stream. After a batch of postal articles have been jogged, a liquid sample from the air sampler is transferred to the bioidentifier to detect and identify biothreat agents.

Each separate threat detection device is controlled and monitored by a host computer running ASAP Sentry™ software. In the event of an alarm from one of the detectors, the ASAP Sentry software will output a digital warning and take other appropriate actions as warranted. Figure 2

shows an actual system, which includes an air sampler, chemical detector and an explosives detector.

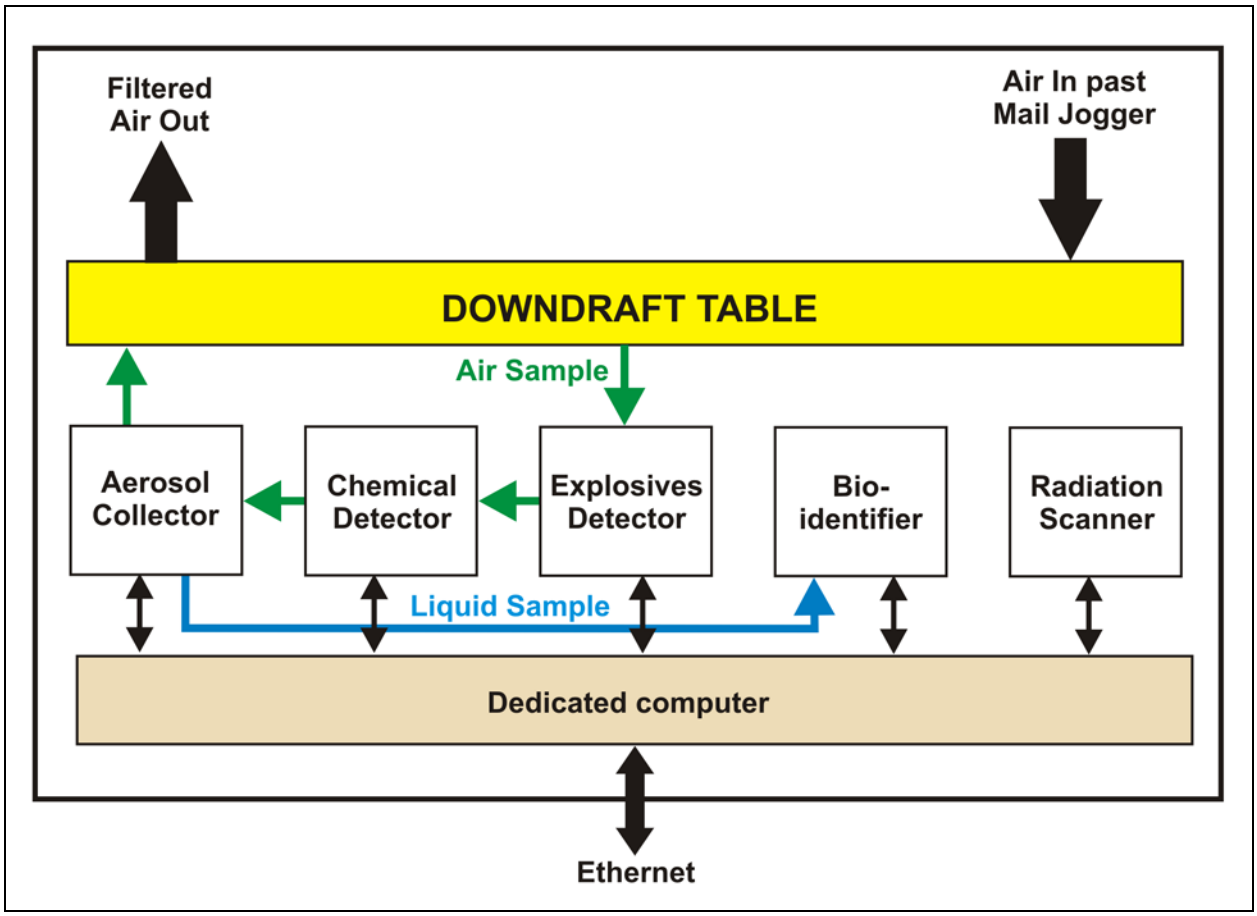

Figure 1: Configuration illustration for ASAP V postal examination system. ASAP Sentry™ software developed by Research International and residing in the Dedicated computer monitors and controls all parts of the system and responds to alarms.

Figure 2: ASAP V postal room configuration with air sampler, chemical, and explosives nuclear detection.

The outputs from all detectors are merged into one monitoring program. This allows implementation of sophisticated responses that are based on all the detector outputs; custom response protocols can be created for individual customers without significant additional cost. For example, if a sudden increase in the biological aerosol level is detected, the software can turn on a dedicated aerosol sampler or bio-analyzer to either gather a sample for later analysis, or to perform an immediate bio-analysis.

By using a dedicated computer, it is also possible to implement a wide range of digital communication links with external monitoring sites. By using Microsoft's Remote Desktop Connection, for example, it is possible to monitor and control the ASAP V from a remote location and provide a level of interaction that is identical to being at the equipment location. This capability is also useful for upgrading software and diagnosing operating problems. Software upgrades are provided at no additional cost as they become available.

Air Sampling

Airborne samples are collected using Research International's SASS 2300 aerosol sampler (U.S. patents 6,532,835 and 7,276,368). This sampler collects particulates at 300 LPM with wetted-wall cyclone technology. The resultant liquid sample is immediately usable by a variety of

bioidentifiers. The individual chemical and explosives detectors take air from this sampling stream immediately upstream from the SASS at their specific sampling rates.

Chemicals

Chemical detectors are integrated into the ASAP V that meet the customer's specific threat profile. Typical chemical detectors include an OEM version of Safran's IMS-based MobilTrace™; or Environics' ChemPro FX; or a custom electrochemical detector array manufactured by Research International. The Environics product is a chemical class-sensitive device that does not identify specific chemicals, but an advantage is that it requires little maintenance: It is a flow-through ion-mobility spectrometer specifically designed for low maintenance applications. The MobilTrace™ is very sensitive and can identify an impressively wide variety of chemicals by specific molecular type, but requires more careful maintenance. The electrochemical detectors are also very sensitive and require minimal maintenance, but the targeted gases are predominantly of an industrial or mine safety nature.
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Explosives and Narcotics

The ASAP V currently uses an OEM version of Safran's IMS-based MobilTrace™ for explosives and narcotics detection. A mentioned earlier, the Mobiltrace is an IMS instrument that provides compound identification, i.e. it will name a target such RDX or heroin. The tradeoff is increased maintenance relative to the ChemPro that must be performed on a daily, weekly and monthly basis by the end-user.

Biological Threats

Liquid samples are collected for later analysis using RI's SASS 2300 aerosol sampler. Identification of biological threats may be done using ANP's NIDS lateral flow instrument or alternatively, identification may be performed on-line using either RI's RAPTOR or BioHawk automated bioidentifiers. The choice of system depends on the number of analyses to be performed as the consumables cost for these assays is the major determinant of operating costs.

The NIDS instrument is a semi-automated version of the DoD HHA. The user adds one drop of sample to a test strip. After 15 minutes, the strip is inserted in a reader and the result is displayed. Each test strip is capable of detecting 5 different threat agents, so each sample must be tested with two different strips to provide identification of 10 different agents. Two test strips are currently available; 5-Plex 1 tests for botulinum toxin, *B. anthracis*, ricin, *F. tularensis* and SEB toxin. 5-Plex 2 tests for *Brucella spps*, vaccinia, *C. burnetii*, *Y. pestis* and VEE. Tests for *Salmonella* and *E. coli* H7:O157 are not available as they are considered less of a threat than SEB and VEE.

The RAPTOR and BioHawk are completely automated instruments for performing immunoassays to identify biological threat agents. The RAPTOR is a four channel instrument capable of running up to 30 assays over 48 hours with the same set of consumables. Two

instruments may be run in parallel to provide tests for eight agents with results available in 17 minutes.

The BioHawk is an eight channel instrument that can run up to 10 tests in 48 hours with the same set of consumables. Both the BioHawk and the RAPTOR have ~ 1% false positive rates per channel. Much lower false positive rates may be obtained by running the same target chemistry on more than one channel.

Radiation

RI has formed a strategic partnership with the Scientific Production Center ASPECT in Dubna, Russia to provide most radiation detection equipment. This equipment is usually in the form of a portal monitor that detects radioactive materials being transported by individuals. As such, the detector is mounted outside the downdraft table in a manner convenient to monitoring the postal articles as they either enter the secure postal examination area or are transferred from point-to-point within the secure area (see for example Figure 3).

Electronics/Software

The ASAP V electronics and ASAP Sentry™ software provide monitoring and integration of signals from detectors having many different types of outputs; RS-232, RS-422, RS-485, USB, or Ethernet. The software also allows alarm levels to be set for each sensor, and for sensors to trigger the collection or real-time analysis of samples. As appropriate, signals are displayed on a common GUI interface that allows visual tracking of the various sensor devices (Figure 4 below).

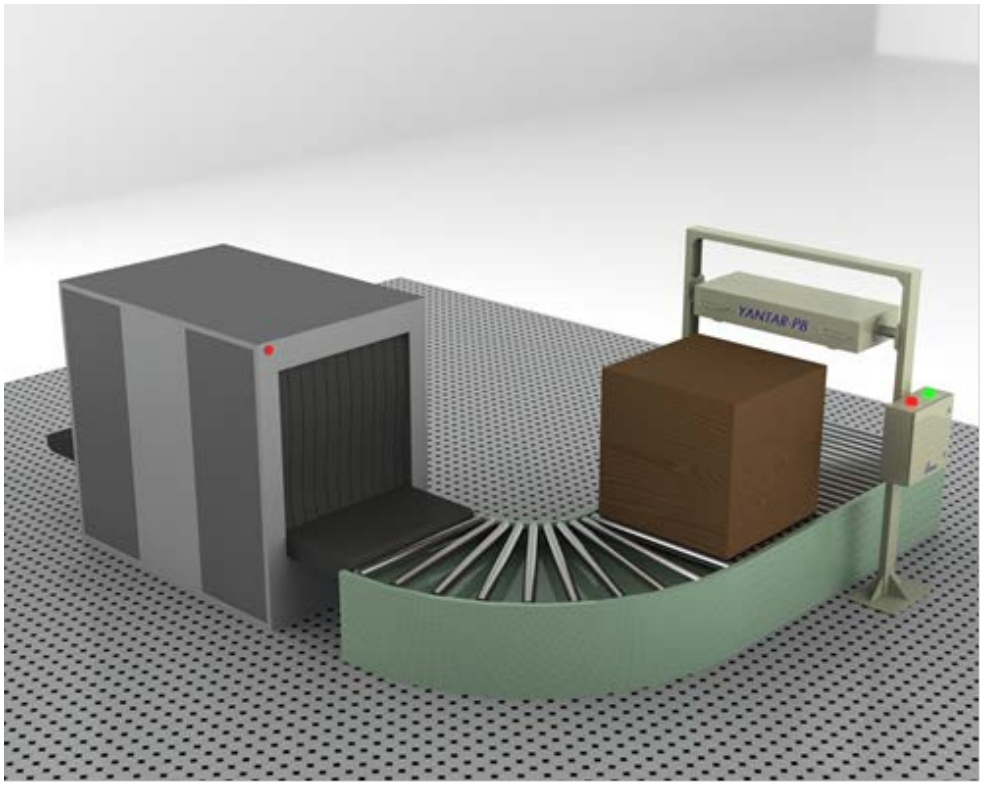

Figure 3. Typical installation of scintillation-based radiation detector in postal room.

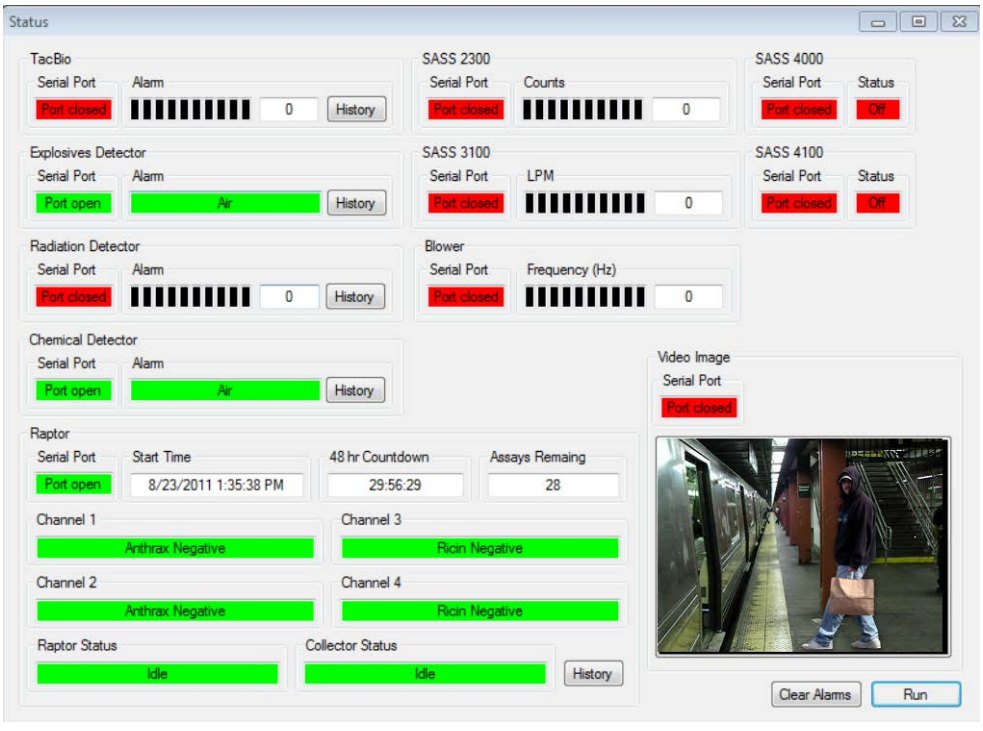

Figure 4: GUI interface for tracking sensors and video.

Physical Packaging

Packaging for the ASAP V is determined in consultation with the customer. For postal rooms the ASAP V is typically hidden under an inspection counter (Figure 5).

Figure 5: ASAP V installed under countertop in Wells Fargo bank Eastern U.S. headquarters postal room.

Prior Work

Research International and its partners have significant experience over the past 10 years designing, building and maintaining postal rooms similar to those requested in this RFP. Notable U.S. customers with postal examination needs have included:

- Wells Fargo Bank
- The World Bank
- U.S. Department of Justice
- U.S. Federal Reserve
- U.S. Federal National Mortgage Association (Fannie Mae)