ECAMS, FAS and Horizon System

Environmental Continuous Air Monitoring System

Fixed Air Sampler Monitoring

Mirion Horizon Monitoring System

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IAMAW-International Association of Machinists and Aerospace Workers

Acronyms and Abbreviations

CPM – Counts Per Minute

ECAM – Environmentally Controlled Continuous Air Monitor

FAS – Fixed Air Sampler
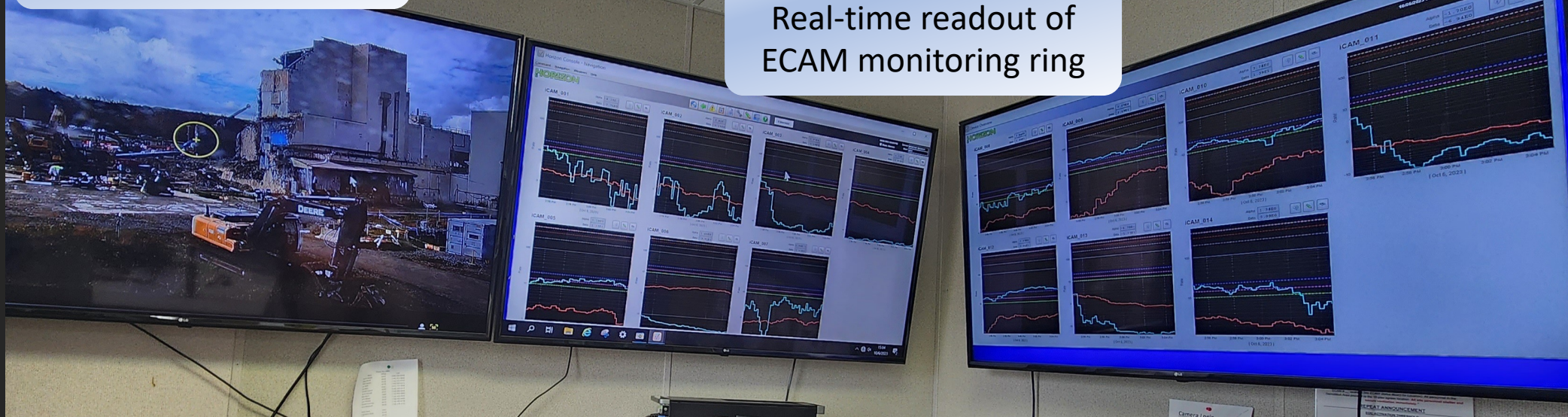
NORM – Naturally Occurring Radioactive Material (natural background)

Real-time video feed of demolition operations

Real-time readout of ECAM monitoring ring

Demolition Control Room

- Monitor ECAMs
- Monitor demolition activities
- Monitor the efficacy of dust suppression
- Monitor wind speed
- Manage air sampling collection

Horizon® Software

- Real-time monitoring system
  - Allows for accurate and real time visual tracking and monitoring of all 14 ECAMs (updated every 15 seconds, with a rolling 10-minute average for background removal)
- Displays data in both numerical values and in graph form
- Displays information in Counts Per Minute
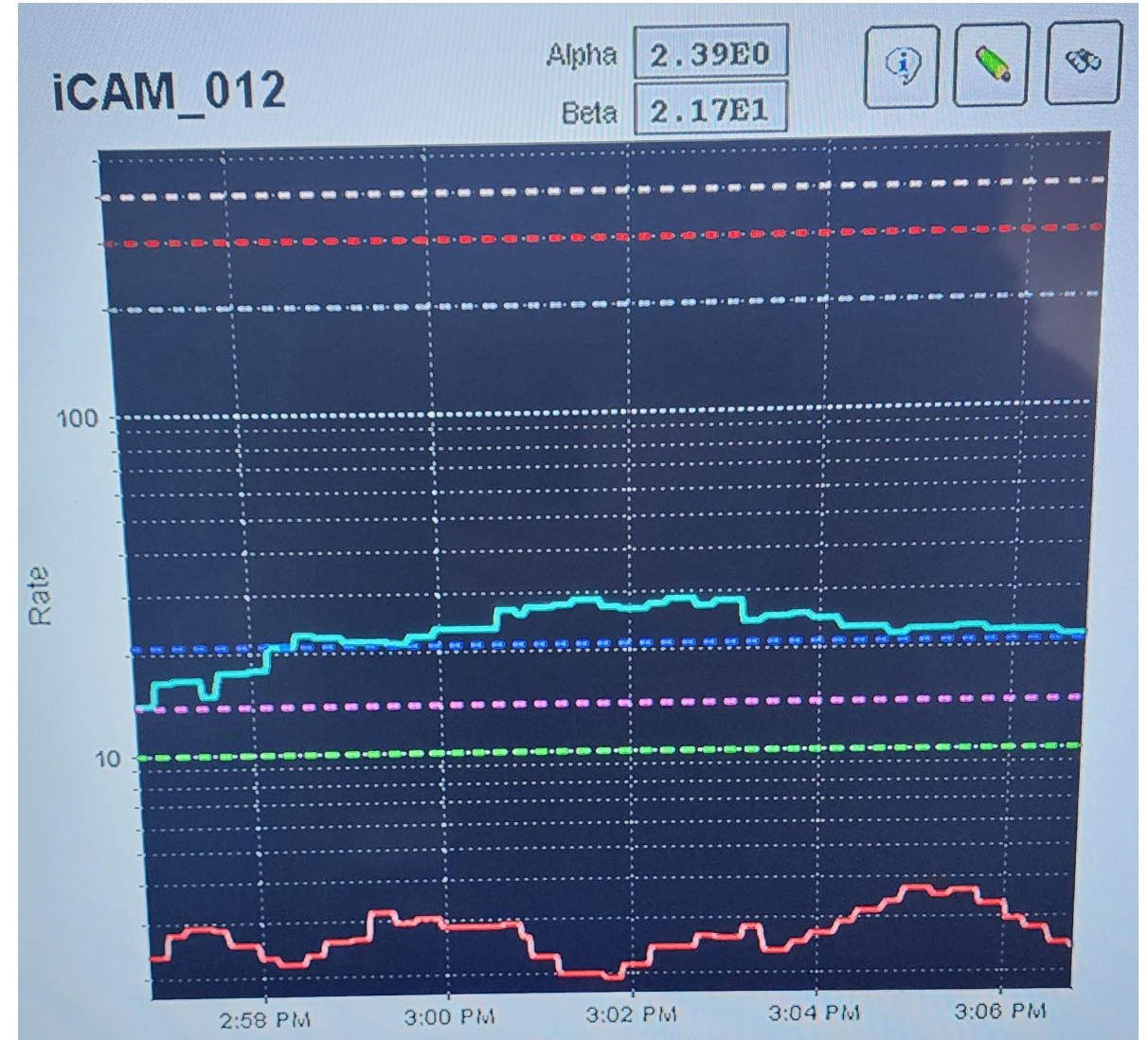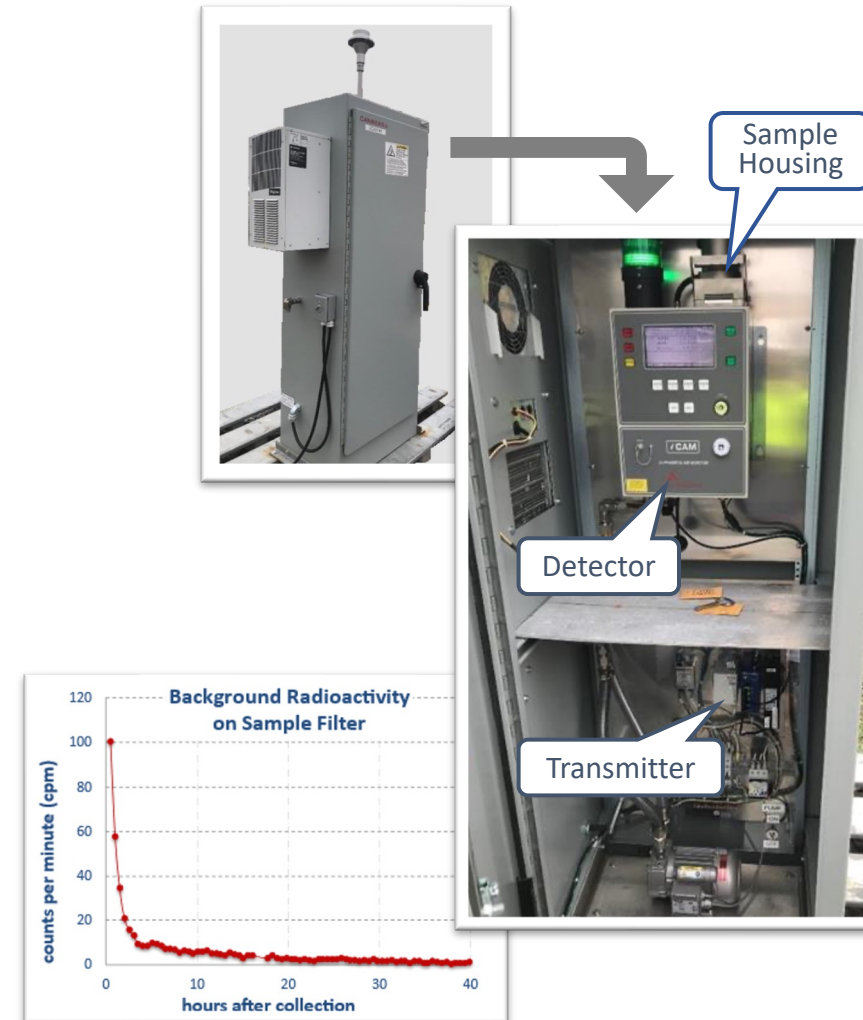
Fixed Air Sampler (FAS)

- 23 Fixed Air Samplers are onsite

- 18 monitored by technicians several times per shift

- Air filter removed at beginning and end of each work shift and sent to count room for analysis

- Not environmentally controlled

- Not monitored in real-time

- Alpha and beta/gamma checks of filter performed throughout the day during "Rove"

Air Monitoring/Sampling Technology

- ## Continuous Air Monitors
  - Contain both a sampling system and a detection system
  - Airborne particulate is collected on a filter that is <u>continuously checked</u> by a radiation detector
  - <u>State-of-the-art</u> software compensates for interference from background radiation
  - Detection capability for onsite monitoring

Sample Housing

Detector

Transmitter

Background Radioactivity on Sample Filter
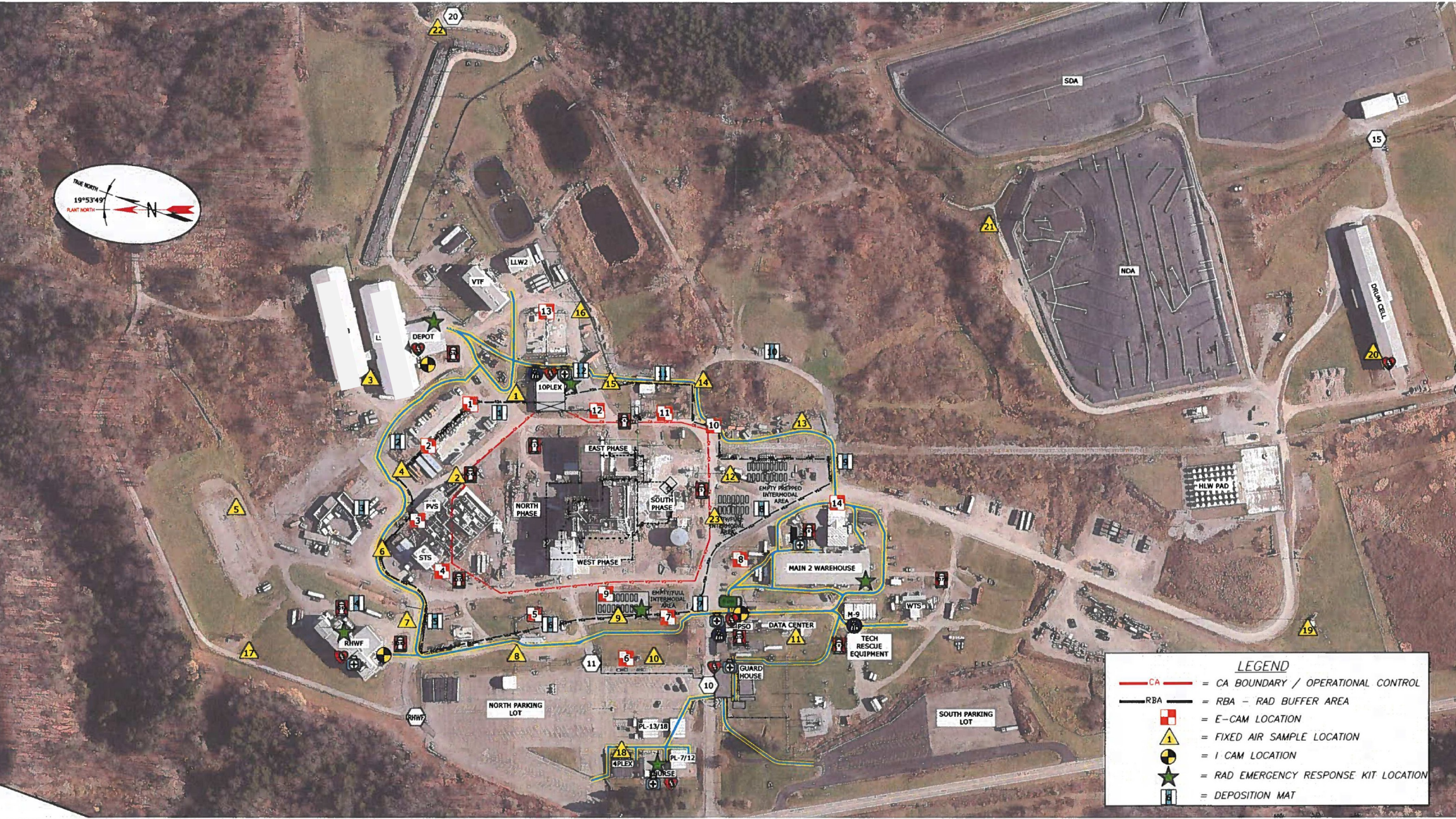
LEGEND

CA ══════	= CA BOUNDARY / OPERATIONAL CONTROL
RBA ══════	= RBA – RAD BUFFER AREA
🟥	= E-CAM LOCATION
🔺	= FIXED AIR SAMPLE LOCATION
⬤	= I CAM LOCATION
★	= RAD EMERGENCY RESPONSE KIT LOCATION
	= DEPOSITION MAT

TRUE NORTH 19°53'49" **PLANT NORTH** N

SDA

NDA

DRUM CELL

HLW PAD

LLW2

VTF

DEPOT

10PLEX

EAST PHASE

NORTH PHASE

SOUTH PHASE

WEST PHASE

PVS

STS

EMPTY PREPPED INTERMODAL AREA

EMPTY/FULL INTERMODAL AREA

MAIN 2 WAREHOUSE

WTS

M-9

RHWF

DATA CENTER

TECH RESCUE EQUIPMENT

GUARD HOUSE

NORTH PARKING LOT

SOUTH PARKING LOT

PL-13/18

4PLEX

PL-7/12

ECAM Alarms

Level 1 Notification

- Airborne contamination at a concentration that would result in a dose of 3.5 mrem*

Level 2 Alert

- Airborne contamination at a concentration that would result in a dose of 5 mrem*

Level 3 Alarm

- Airborne contamination at a concentration that would result in a dose of 7.5 mrem*

Represents a small fraction of the annual worker dose limit

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Level 1 Notification

- Pause demolition activities
  - Demolition
  - Waste loadout
- Radiation Safety Manager determines if work may continue, or if work shall be suspended
- Monitor other ECAMs for increase
- Recovery actions may include:
  - Modifying dust suppression
  - Reducing the rate of demolition or waste loading
  - Increasing monitoring frequency for fixed air samplers and deposition pads
  - Determining if alarm was due to instrument malfunction or NORM
- Return to work per Radiation Safety Manager

Level 2 Alert

- Stop demolition activities
  - Demolition
  - Waste loadout
- Demolition personnel exit the area based on Radiation Control (RC) direction
- Monitor other ECAMs for increase
- Remove ECAM filter as directed by RC Supervision
  - Analyze filter to determine if alarm was due to instrument malfunction or NORM
- Recovery actions may include:
  - Modifying dust suppression
  - Reducing the rate of demolition or waste loading
  - Increasing monitoring frequency for fixed air samplers and deposition pads
- Return to work per Radiation Safety Manager

Level 3 Alarm

- Stop demolition activities
  - Demolition
  - Waste loadout
- Site-wide sheltering initiated by Radiation Controls
- Demolition personnel exit the area based on Radiation Control (RC) direction
- Monitor other ECAMs for increase
- Remove ECAM filter as directed by RC Supervision
  - Analyze filter to determine if alarm was due to instrument malfunction or NORM
- Recovery actions may include:
  - Modifying dust suppression
  - Reducing the rate of demolition or waste loading
  - Increasing monitoring frequency for fixed air samplers and deposition pads
- Return to work per Radiation Safety Manager

RADCON EMERGENCY RESPONSE FOR ECAM LEVEL 3 ALARM

Control Room

- Verify Level 3 alarm
- Initiate site-wide shelter alarm, using pre-written script
- Make all other notifications
- Log alarm, activity at time of alarm, check other ECAMs nearby
- Wait for event to stabilize, then per supervisor/manager direction, RADCON verify conditions and retrieve data

RADCON EMERGENCY RESPONSE FOR ECAM LEVEL 3 ALARM

Radiation Controls Response

- Verify conditions at location of alarm, including wind direction, wind speed and path of approach
- Technician suits up, with respirator, and proceeds to the alarming ECAM
- Technician surveys travel path to the ECAM, notifying Control Room of findings, then surveys ECAM and immediate area
- Filter is removed and switched for a new filter; and it is then taken to count room where it will be analyzed

SHELTERING AREA RESPONSE FOR ECAM LEVEL 3 ALARM

Workforce Response

- Upon initiating site-wide sheltering, employees enter closest sheltering area and secure ventilation
- Personnel remain in area until released by Radiation Safety Manager

FAS Monitoring

- Sample is checked with survey meters in the field
- Numbers recorded and logged
- Report any readings not consistent with NORM (e.g., Radon)
- Smear taken on outside of the sampler for deposition monitoring

Deposition Monitoring

- Deposition Mat
  - Background check taken at each location
  - Smear taken across all three zones and checked for radioactivity
  - Direct scan (survey) check taken on individual zone

Summary

- Demolition activities are continuously monitored
  - Over 35,000 air/deposition samples collected and analyzed since the start of demolition activities
- Multi-tiered air monitoring program
  - Real-time monitoring (ECAMs)
  - Continuous sampling (FAS)
  - Breathing zone personal air sampling
  - Samples analyzed after decay of NORM (e.g., Radon)
- Tracking and trending of data

Environmental Continuous Air Monitors (ECAMs)

14 ECAMs positioned in a monitoring ring around the demolition area
- 12 functional at all times during demo
- 2 maintained as running spares

Continuously monitored in Control Room through the Horizon System
- State of the art software that compensates for background radiation

Filters are removed for analysis at the beginning and end of working shifts
- Filters are counted immediately and recounted after 7-10 days
- Days no work is done, pulled once a day

Detector performance verified weekly using calibration source

Visual and audible alarms
- Flashing red light indicates elevated contamination levels
- Flashing green light indicates mechanical or software issues

Airborne particulate is collected on a filter and continuously checked by a radiation detector

Monitors for alpha, beta and gamma emitters in airborne particulate

Air Intake

Filter housing

Detector

Transmitter