

OPGP04-ZA-0002, Rev. 28	<b>Condition Report Engineering Evaluation (CREE)</b>	Page 1 of 8
Form 1	Engineering Evaluation	
CR Action #: 19-13211-21, Supp 3		CR Level: 4N
DTL #1008468 except as noted below		
<b>CREE Type:</b> <input checked="" type="checkbox"/> GENERAL Evaluation (See Addendum 2)		
<input type="checkbox"/> MATERIAL DEFICIENCY ---> (Classify) (Potential or Actual) (See Addendum 1)		
<input type="checkbox"/> DEGRADED [DTL #1008489]		
<input type="checkbox"/> NONCONFORMING [DTL #1008488]		
<input type="checkbox"/> NEITHER		
<input type="checkbox"/> Aging ECO (See Addendum 6)		
<input type="checkbox"/> GL 86-10 Evaluation (See Addendum 7)		
<input type="checkbox"/> FME (See Addendum 8)		
<input type="checkbox"/> IER L1-13-10 (See Addendum 9) [DTL #1015245]		
<b>Problem Statement :</b> It is desired to temporarily locate HP monitoring equipment inside the RCB during Mode 1 to support the implementation of the monitoring of personal dosimeter, and Area radiation monitors for live time dose rate trending to support online and outage (Forced and Refuel) activities. Outages New equipment must be reviewed as a result of the SRD Replacement Project, PIP 18210C.  The introduction of temporary items inside containment calls for an evaluation of: floor loading; seismic II/I requirements; emergency sump blockage; fire hazards; and impact on heat sinks and containment free volume and sub-compartment pressurization.  Supp. 1 corrects a typo on Page 1 and clarifies a statement on Page 4.  Supplement 2 adds clarity to the problem statement on Page 1.  Supplement 3 extends this CREE for the next 365 days to allow the existing equipment to remain in the RCB. No additional equipment has been added and no changes have been made to the existing equipment. Updates were made to the reference revision numbers.		
<b>Conclusion:</b> The temporary location of the proposed items inside the RCB during Mode 1 to Mode 4 is acceptable as further described on the following pages.  This is applicable to Unit 1 and to Unit 2		
<b>Additional Actions Required?</b> <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes    If Yes, list CR Action #s		
Ivan Lopez / <i>[Signature]</i> 4-17-23 Preparer (Print/Sign)      Date		Technical Review Required if Level 1 (Q), or Level 2 (Q) Jeremy Supak / <i>[Signature]</i> 4/17/23 Technical Reviewer (Print/Sign)      Date
N/A		Todd Maxey / <i>[Signature]</i> 04/17/2023 Responsible Supervisor (Print/Sign)      Date
N/A		Manager Approval Required if Level 1 (Q), or Level 2 (Q), or FME evaluation with potential fuel impact. N/A
Other Reviewers (Print/Sign)      Date		Manager (Print/Sign/Title)      Date

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Form 3	CREE Continuation Sheet	

## Background

Previous CREEs 21-9703-1, 14-4243-1, 15-220-5, 15-161-61, and 15-161-9 addressed these items for outages in the past. This new CREE is general for both Units and includes additional items and details.

To support the HP monitoring requirements, the following equipment items need to be temporarily located inside containment during Modes 1-4 prior to cold reactor shutdown (Mode 5):

### HP Telemetry Items

#1	Three (3)	Adaptive Wireless Monitor (AWM)	7.1" x 4.1" x 2.25", 2lbs (Total: ~6 lbs)
#2	Three (3)	Power Cords for AWM, 10 ft each	(Total: ~2 lbs)
#3	Three (3)	Fiber Network Cables (CAT), 30 ft each	(Total: ~4 lbs)
#4	Three (3)	Extension Power Cords with ground fault device; lengths 100 ft.	(Total: ~25 lbs)
#5	Three (3)	Antenna with antenna cable (coaxial cable, approximately 5 ft length); secured to a structural member with tie-wraps;	(Total: ~6 lbs)
#6	Fifty (50)	RDS-31Tx Telemetry Survey Meters	7.1" x 4.1" x 2.25", 2lbs (Total: ~6 lbs)

Items will be located on the RCB El. 68' walkway, RCB El. 37' near Room 307; RCB 19' near entry in Room 208 and Room 211; RCB El. -11' Room 002, Room 003, and near Room 004. All equipment items are to be located outside of the secondary shield wall.

## Evaluation

This evaluation is applicable for Mode 1 through Mode 4. It is applicable for Unit 1 and for Unit 2.

These items will be located outside of the secondary shield wall in Modes 1-4. Previous installation of similar items was covered by DCP 07-9892-6 "Installation of Wireless Communication System in Seismic Buildings" and by ITG-010 "Wireless LAN Installation Guideline". The practice has been to temporarily install any such equipment items inside containment during outages and to remove them from going from Mode 5 to Mode 4. The containment closeout procedure 0PSP03-XC-0002 verifies that any such equipment inside the secondary shield wall has been removed prior to Mode 4 entry.

The storage areas of the RCB have a design floor loading of 200 psf or greater per Design Criteria 5C019SQ1006. Since the items are relatively small in weight, the temporary addition of these equipment items can be accommodated.

Since the added items are located in a Seismic II/I area, Addendum 7 of 0PGP03-ZA-0098 "Station Housekeeping" needs to be reviewed. Addendum 7 calls for properly securing temporary items if they could tip over during a seismic event and hit safety related equipment. Addendum 7 requires that the Work Group supervisor review possible affected safety-related components prior to staging items in a Seismic II/I area. These items are to be located per ITG-010 which addresses Seismic II/I area aspects.

This form when complete, SHALL be retained for the life of the plant.

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The NPSH margin for the ECCS Pumps depends upon keeping the value of the emergency sump strainer blockage area small. All of these items are located outside of the secondary shield wall during Modes 1 - 4. Since the added items have sufficient weight and/or are sufficiently restrained, they will not be transported to the ECCS sump strainers on the south side of RCB Room 010 on the El. (-) 11 ft. In the Post-LOCA environment, the items may distort; but they are not considered to break up into very small pieces that would easily transport onto the strainers. The items are also not within the zone of influence of any of the postulated pipe break locations inside the secondary shield wall that define the design basis post-LOCA debris amounts (see debris generation analysis by Alion listed in References). Thus, post-LOCA sump debris is not a concern.

The Fire Protection staff evaluates the transient combustible material as described in procedure 0PGP03-ZF-0019 Rev. 20 "Control of Transient Fire Loads". Transient fire load permits are needed and must be completed prior to the installation of the equipment items.

These items have a relatively small volume and metal surface area. They are within the allowances for metal added inside the RCB that are given in Calculation MC-6477 Rev. 5 and NC-7014 Rev. 4. They have a negligible impact on the analyses that use the containment free volume and heat sink area as input.

Tracking of aluminum is needed for analysis of post-LOCA sump water chemical effects. The equipment items have a surface area of less than 35 square feet of aluminum and are bounded by the aluminum addition evaluation done under DCP 07-9892-6 for 34 Access Points and 2 LAN switches. This amount of aluminum is within the allowance of 103 sq. ft. from Table 2 of MC-6477. Thus, the aluminum material is acceptable.

The items are located outside the secondary shield wall so that there is no impact on sub-compartment pressurization.

## Conclusion

The temporary location of the equipment items inside the RCB during Mode 1 through Mode 4 is acceptable. Transient Fire Load Permits must be issued before equipment is installed in temporary locations.

This evaluation is applicable to Unit 1 and to Unit 2.

All items shall be located and/or secured in accordance with Addendum 7 of 0PGP03-ZA-0098 "Station Housekeeping" or IT Guideline ITG-10.

None of the cables is to be laid across hot piping.

The storage of the equipment shall not interfere with normal ingress and egress to RCB locations. Access to installed plant equipment shall not be restricted (i.e., plant operators shall have access to plant equipment).

This form when complete, SHALL be retained for the life of the plant.

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Storage locations shall not be near high energy pipe breaks as defined below:

- no storage inside the bioshield wall
- no storage in the RHR valve rooms
- no storage in the RHR heat exchanger rooms
- no storage in the radioactive pipe chase at El. 29 ft.
- no storage near the main steam and feedwater piping between El. 37 ft. and El. 52 ft.

This equipment shall be removed from the RCB prior to 365 days unless justified with further evaluation.

### Additional Required Actions

None

### References

CREE 14-4243-1  
 CREE 15-220-5  
 CREE 15-161-61  
 CREE 15-161-69  
 DCP 07-9892-6 "Installation of Wireless Communication System in Seismic Buildings"  
 ITG-010 Rev. 2, "Wireless LAN Installation Guideline"  
 Design Criteria 5C019SQ1006 Rev. 4, "Design Criteria – Containment Internal Structure"  
 0PGP03-ZF-0019 Rev. 20 "Control of Transient Fire Loads"  
 0PGP03-ZA-0098 Rev. 18, "Station Housekeeping"  
 0415-0100008WN Rev. C, Calculation by Alion "GSI 191 Containment Recirculation Sump Evaluation: Debris Generation"  
 Calculation MC06477 Rev. 5, "Added Commodities Inside the RCB"  
 Calculation NC07014 Rev. 4, "Passive Heat Sinks for ECCS Back-Pressure Analysis"  
 0PSP03-XC-0002 Rev. 72, "Initial Containment Inspection to Establish Integrity"

### Attachments

1. Adaptive Wireless Monitor (AWM), WR3-A010, Mirion Technologies, 07-00003 (Rev 0) & 15-00161 (Rev 0)
2. Telemetry Survey Meter, RDS-31iTx, Mirion Technologies, 20996595\_RDS31iTx\_TxSD\_EN\_C



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Radiation. **Safety.**

# AWM

Adaptive Wireless Monitor



Nuclear  
Power



Homeland  
Security  
& Defense



Industrial and  
Manufacturing



Healthcare



Labs and  
Education

## OVERVIEW

The Adaptive Wireless Monitor (AWM) is a dynamic new wireless remote monitor system that now represents an ALL-in-ONE solution for nuclear industry remote monitoring. This compact system can be deployed as a base station, MESH repeater, external transmitter device, active dive repeater, etc.; which minimizes the different types of inventory that must be maintained. The AWM includes a DB9 RS-232 communication port, USB communication port, Power-over-Ethernet (POE) or Wi-Fi. The AWM uses a colored touchscreen for on-screen defined configurations.

## KEY FEATURES

- Adaptable to interface with a wide range of radiation monitors and other measuring devices
- WRM2, Wi-Fi, Blue-tooth, and GPS capability
- Touch-screen user interface allows configuration in the field
- Power-over-Ethernet
- >8 hour batter backup

Health Physics Division

## MECHANICAL CHARACTERISTICS

- Display: On-screen configuration
- Dimensions: 7.1 x 4.1 x 2.25 in (180 x 104 x 57 mm)
- Weight: 32 oz

## OPERATING CHARACTERISTICS

- WRM2, Wi-Fi, Blue-tooth, and GPS capable
- Power-over-Ethernet
- WRM2 Radio 900 MHz or 2.4 GHz frequency
- Communication Ports:
  - (1) DB9 Serial (RS 232)
  - (1) Micro-USB
  - (1) Power-over-Ethernet (POE)

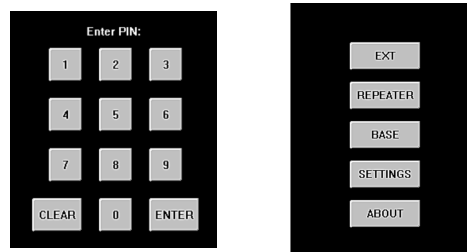
## ELECTRICAL CHARACTERISTICS

Power Options:

- 9V – 24V external power adapter
- Power Over Ethernet (POE) power (48V – 57V), POE 802.3af conformance, 0.5W typical
- USB power
- Internal 6Ah Lithium-Polymer (LiPo) battery pack (>8hr backup life)

## ENVIRONMENTAL CHARACTERISTICS

- Ingress Protection: IP67
- Rugged aluminum enclosure
- Operating Temperature range: -13F to +131F (-25C to +60C)
- Storage Temperature range: -40F to +158F (-40C to +70C)
- Relative humidity: up to 85% at 95F (35C)



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## SURVEY METER

# RDS-31iTx™ RDS-31iTxSD™

### Telemetry Survey Meter

The RDS-31iTx/iTxSD meters are Wireless Ready Telemetry Survey Meters, utilizing the WRM2 communication protocol for Wireless Remote Monitoring applications. The use of radiation telemetry equipment improves the communication between workers, technicians and supervisors.



## FEATURES

- H\*(10) ambient dose equivalent dose and dose rate measurements
- Wide range of external alpha, beta, gamma and neutron probes for direct connection with RDS-31iTx/RDS-31iTxSD meter
- New ergonomic design
- Large graphic display, configurable backlight with automatic illumination control
- High impact durable case construction, IP-67 immersion proof
- Internal memory to store measurement data
- Flexible histogram functions
- Firmware of instrument upgradable through cable link
- Operational parameters fully configurable with CSW-31 software
- Configurable shortcut functions
- WRM communication 2.4 GHz 10 mW ISM radio for European frequency range, 900 MHz 100 mW ISM radio for US frequency range



## DESCRIPTION

RDS-31iTx/iTxSD meters are small handheld, battery operated survey instruments using an energy compensated GM-tube or PIN diode as primary detector. Due to its versatile functions and durability it is suited for a wide range of applications in civil defense, industrial and laboratory use etc. It helps in making real time decisions quickly, providing real time survey data. It also reduces critical work time and most importantly enhances safety and ALARA procedures.

RDS-31iTx/iTxSD feature excellent ergonomics; light weight and easy handling, with visual and audible alarms and internal vibrator. The large graphic display with Energy Save Backlight is well visible even in sunny conditions due to the illumination control.

To extend the capabilities of the instrument, external probes from GMP-12/GMP-25/GMP-11-3 series, and CSP™ probes SAB-100, SABG-100, SG-1/2R, SX-2R and SN-S can be connected to RDS-31 meter directly through binder connector.

With SAB-100 probe, RDS-31 displays simultaneously alpha and beta contamination measurements in addition to internal detector dose equivalent rate.



**RDS-31iTx™**

- Radiation detected: gamma and X-rays, 48keV...3MeV. Alpha, beta, and neutron radiation with external probes
- **Detectors: one energy-compensated GM tube**, energy response according to ambient dose equivalent H\*(10)
- **Dose rate measurement range: 0.01 µSv/h...0.1 Sv/h or 1 µrem/h...10 rem/h**
- **Dose measurement range: 0.01 µSv...10 Sv or 1 µrem...1000 rem**
- Resolution: three significant digits or 0.01 µSv/h on dose rate and 0.01 µSv on dose (1 µrem/h on dose rate and 1 µrem on dose)
- Calibration accuracy: ± 5%, 137Cs, calibration direction and in the calibration field, temperature +20 °C (68°F)
- Variation of the response due to photon radiation energy and angle of incidence: ( R E,A ) 71% < RE,A < 160% (48 keV...3 MeV); ± 60°
- Complies with ANSI N42.33 and IEC 60846 standards

**RDS-31iTxSD™**

- Radiation detected: gamma and X-rays, 60keV...6MeV. Alpha, beta and neutron radiation with external probes
- **Detectors: silicon detector, one large area PIN diode**, energy response according to ambient dose equivalent H\*(10)
- **Dose rate measurement range: 10 µSv/h...10 Sv/h or 1 mem/h...1000 rem/h**
- **Dose measurement range: 10 µSv...200 Sv or 1 mrem...20 krem**
- Resolution: three significant digits or 0.01 µSv/h on dose rate and 0.01 µSv on dose (1 µrem/h on dose rate and 1 µrem on dose)
- Calibration accuracy: ± 5%, 137Cs, calibration direction and in the calibration field, temperature +20 °C (68°F)

**FUNCTIONAL CHARACTERISTICS**

- Two buttons to operate the instrument
- Configurable units: Sv(h), R(h), with external detector Gy(h), cps, cpm, dpm, Bq and Bq/cm<sup>2</sup>
- Flexible histogram functions (dose rate, dose, diagnostic logging depending on configuration, time stamp, optional location control for mapping and repeating room measurement analysis)
- Additional histogram analyzing capabilities on CSW-31 software
- Real time clock function
- Configurable audible, visual and vibration alarm
- RF-communication and USB-communication with adapter

**ELECTRICAL CHARACTERISTICS**

- Power supply: 2 AA size batteries (alkaline or NiMH)
- Contacts for external power and charging of NiMH battery (charging conditions +5... +35°C)
- Operation time with fresh alkaline batteries more than 4 months at background radiation at +23°C, 8 h use/24h
- Operation time with fully charged NiMH batteries more than 1 month at background radiation at +23°C, 8 h use/24h. At higher/lower temperatures the operation will be shorter.

**ENVIRONMENTAL CHARACTERISTICS**

- -25°C...+60°C (-40°F to 131°F), operating temperature
- -40°C...+70°C (-40°F to 158°F), storage temperature
- Relative humidity: up to 85% at +35°C (95 °F)
- Fulfills the RF-immunity levels of applicable standard

**MECHANICAL CHARACTERISTICS**

- Case high impact durable plastics reinforced with glass fibre
- Ergonomic design, rubber grip and cushion around the case
- Enclosure class IP67 (IEC 60529), water proof including battery compartment
- Dimensions: 100 x 67 x 33 mm (3.93 x 2.63 x 1.29 in)
- Weight: 175 g without batteries (0.385 lb), 220 g with batteries (0.485 lb)
- Wrist/neck strap
- Belt clip

**OPTIONS**

- Electrical cradle or mechanical cradle e.g. for easy vehicle installation
- Alarm monitor combinations for fixed/deployable applications
- Coil or straight cable for external probes

**RADIO MODULE**

- 2.4 GHz ISM DSSS Transmitter
- Default transmit power: 10 mW
- FCC ID: OUR-XBEEPRO
- IC: 4214A XBEEPRO
- 900 MHz ISM FHSS Transmitter
- Transmit power: 100 mW
- FCC ID: MCQ-XBEEEXSC
- IC: 1846A XBEEEXSC

