



HITACHI








I&C PLUS



I&C Plus

Nuclear Instrumentation System Reliability and Performance Improvement Program

Three phase program

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|  <p>PERFORMANCE</p>  <p>RELIABILITY</p>  <p>OEM INDUSTRY EXPERTS</p> | <h3>OFF SITE ASSESMENT</h3> <ul style="list-style-type: none">• Off-Site Review (Up to 5 instruments or more as time allows)<ul style="list-style-type: none">– Instrument CR/IR History– Test Data– Work Performed• Nuclear Instrumentation Support<ul style="list-style-type: none">– OEM Expertise– One Week• Recommendation Report <p>1</p> |
|  <p>DIAGNOSTIC</p>  <p>SCOPE</p> | <h3>PRE-OUTAGE</h3> <ul style="list-style-type: none">• On-Site system Walkdown and Testing (On-Site – 1 Week)<ul style="list-style-type: none">– OEM Expertise– Detector and Signal Path Health Assessment– Testing (A predetermined number of instruments or as time allows)– Five (8 hour) weekdays (inclusive of in-processing requirements)• Customer provided GEH approved test equipment (Optional GEH Equipment)• Analyzed Test Data Report<ul style="list-style-type: none">– Recommended Outage Scope– Recommended Non-Outage Scope– Work Outline Completed <p>2</p> |
|  <p>TROUBLESHOOT</p>  <p>POST TEST</p> | <h3>OUTAGE</h3> <ul style="list-style-type: none">• Nuclear Instrumentation Support (On-site – 1 Week)<ul style="list-style-type: none">– OEM Expertise– Typically 6 Days (Monday-Saturday)– Optional additional to support outage schedule windows– Daily rates available• Nuclear Instrumentation Troubleshooting• Post Maintenance Testing• Customer provided GEH Approved Test Equipment (Optional GEH Equipment)• Execute recommended Phase 2 Scope<ul style="list-style-type: none">– Customer Agreed upon scope– Scope determined by site schedule availability / access• Integrate with GEH Under Vessel Team to schedule NI Support windows <p>3</p> |

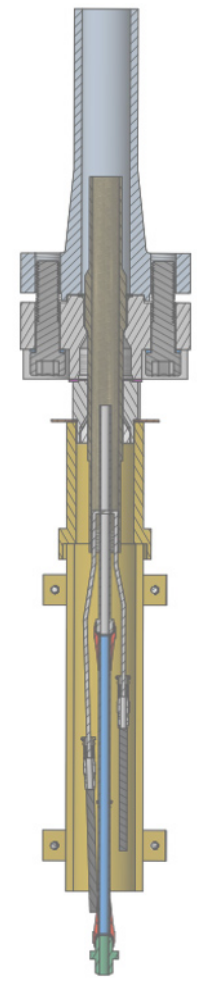
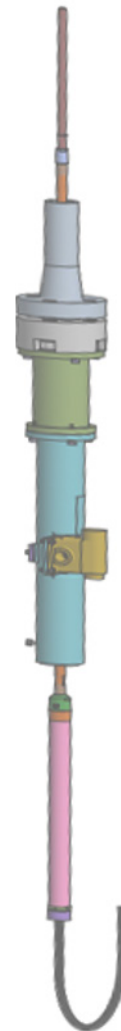
- OEM industry experts with comprehensive understanding of the entire neutron monitoring system
- Extensive knowledge from the reactor to the control room
- Extensive knowledge of GEK and SIL documentation applicable to the site
- OEM support and design basis owner
- Direct and seamless partnership with the GE Under Vessel team

Value

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|-----------------------------|---|
| Critical Path Savings | Decrease cycle time from issue identification to resolution |
| Parts Savings | Avoid Incorrect Scope Performance |
| Dose Savings | Incorrect Scope Performance in High Dose Areas (Under Vessel) |
| Knowledge Transfer | Work directly with site System Engineer |
| On The Job Training | OEM SME works directly with IMD Technicians |
| Improved Station Procedures | Update with best practices and latest GEH SILs |
| Improved System Performance | Reduce half SCRAMs and recover LPRM operability |

Troubleshooting and Testing

- Utilization of GE test methods and diagnostics
- Systematic and comprehensive troubleshooting techniques
- Real-time signal path and detector monitoring
- High-Current detector testing and recovery
- Verification of signal output and system noise levels
- Ability to compare data from multiple GE BWRs
- Time Domain Reflectometry (TDR) traces
- Conductor shield-to-ground Insulation Resistance (IR)
- Current-Voltage Characteristic curve (IV) measurements
- Cable Breakdown Testing
- SRM/IRM Pre-Amp Testing / Assess SRM Operating Voltages
- NUMAC operation and troubleshooting
- Examine SRM/IRM drawer modules and power supplies
- Assess WRNM detector performance and signal path integrity
- Assist with IRM Range issues
- Assess Nuclear Instrumentation Mechanical Equipment Health
- Assess TIP System Issues (Mechanical and Signal)
- Assess SRM/IRM Detector Drive Issues
- Review and assess Rod Position Information System (RPIS) issues
- Examine and assess connectors and cabling
- Review cabling penetration health
- Compare site assessments with GEH historical data
- Assess Nuclear Instrumentation Electronic System Health
- Review SRM/IRM/WRNM Drawer Readings
- Assess grounding condition / configuration
- System noise reduction



Controls and Electronics Experience

IRM

- IRM Preamplifier Gain Checks
- Adjust IRM Range 6 to Range 7 Correlation
- Range Switch
- Range Switch Decoder and Calibration Unit
- Range Switch Decoder Card
- Voltage Pre-Regulator
- Voltage Regulator
- High Voltage Power Supply
- Amplifier Attenuator Module
- Inverter Module
- Mean Square Analog Module
- Signal Level Amplifier
- Dual Trip Units

NUMAC

- SRM
- WRNM/SRNM
- PRNM
- A-TIP

SRM

- SRM Preamplifier Gain
- Voltage Pre-Regulator
- Voltage Regulator
- High Voltage Power Supply
- Pulse Height Discriminator
- Log Level Integrator
- Log Count Rate Amplifier
- Period Amplifier
- Dual Trip Units

APRM

- APRM
- LPRM Cards
- Flow Subsystem Cards
- Averaging Cards
- DC Amplifier Cards

