### Form 4.1-AP AP1000 Examination Outline

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| Facility: Date of Exam: | | | | | | | | | | | | | | | | | | | | |
| Tier | Group | RO K/A Category Points | | | | | | | | | | | | | | SRO-Only Points | | | | |
| K1 | K2 | | K3 | K4 | K5 | | K6 | A1 | A2 | A3 | A4 | G | Total | A2 | | G | | Total |
| 1.  Emergency and Abnormal Plant Evolutions | 1 |  |  | |  | N/A | | | |  |  | N/A | |  | 18 |  | |  | | 6 |
| 2 |  |  | |  |  |  |  | 8 |  | |  | | 4 |
| Tier Totals |  |  | |  |  |  |  | 26 |  | |  | | 10 |
| 2.  Plant  Systems | 1 |  |  | |  |  |  | |  |  |  |  |  |  | 28 |  | |  | | 5 |
| 2 |  |  | |  |  |  | |  |  |  |  |  |  | 9 |  |  |  | | 3 |
| Tier Totals |  |  | |  |  |  | |  |  |  |  |  |  | 37 |  | |  | | 8 |
| 3.  Generic Knowledge and Abilities Categories | CO | | | EC | | | | | | RC | | EM | | | 6 | CO | EC | RC | EM | 7 |
| 2 | | | 2 | | | | | | 1 | | 1 | | |  |  |  |  |
| 4. Theory | Reactor Theory | | | | | | | Thermodynamics | | | | | | | 6 |  | | | | |
| 3 | | | | | | | 3 | | | | | | |

Note: CO = Conduct of Operations; EC = Equipment Control; RC = Radiation Control;

EM = Emergency Procedures/Plan

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| Form 4.1-AP AP1000 Examination Outline Page 2  Emergency and Abnormal Plant Evolutions—Tier 1/Group 1 (RO/SRO) | | | | | | | | | |
| E/APE # / Name | K1 | K2 | K3 | A1 | A2 | G | K/A Topic(s) | IR | # |
| E-0, Reactor Trip or Safeguards Actuation |  |  |  |  |  |  |  |  |  |
| ES-0.1, Reactor Trip Response |  |  |  |  |  |  |  |  |  |
| ES-1.3, ADS Stage 1–3 Actuation Response |  |  |  |  |  |  |  |  |  |
| ES-1.4, ADS Stage 4 Actuation Response |  |  |  |  |  |  |  |  |  |
| A-313, Uncontrolled Cooldown |  |  |  |  |  |  |  |  |  |
| A-336, Malfunction of Protection and Safety Monitoring System |  |  |  |  |  |  |  |  |  |
| E-1, Loss‑of‑Coolant Accident |  |  |  |  |  |  |  |  |  |
| A-342, Reactor Coolant Pump Malfunction |  |  |  |  |  |  |  |  |  |
| A-337, Passive RHR Heat Exchanger Leak |  |  |  |  |  |  |  |  |  |
| A-343, Loss of Normal Residual Heat Removal |  |  |  |  |  |  |  |  |  |
| A-317, Loss of Component Cooling Water |  |  |  |  |  |  |  |  |  |
| ES-0.2, Natural Circulation Cooldown |  |  |  |  |  |  |  |  |  |
| FR-S.1, Response to Nuclear Power Generation |  |  |  |  |  |  |  |  |  |
| E-3, Steam Generator Tube Rupture |  |  |  |  |  |  |  |  |  |
| E-2, Faulted Steam Generator Isolation |  |  |  |  |  |  |  |  |  |
| A-301, Rapid Power Reduction |  |  |  |  |  |  |  |  |  |
| A-307, DAS Operations at Local Cabinets |  |  |  |  |  |  |  |  |  |
| FR-C.1, Response to Inadequate Core Cooling |  |  |  |  |  |  |  |  |  |
| A-323, Loss of 6.9‑kV, 4,160‑V, or 480‑V Bus Power |  |  |  |  |  |  |  |  |  |
| ES-1.1, Passive Safety System Termination |  |  |  |  |  |  |  |  |  |
| A-345, Loss of Nuclear Service Water |  |  |  |  |  |  |  |  |  |
| A-329, Loss of Instrument Air |  |  |  |  |  |  |  |  |  |
| ECA-1.1, Loss‑of‑Coolant Accident Outside Containment |  |  |  |  |  |  |  |  |  |
| FR-H.1, Response to Loss of Heat Sink |  |  |  |  |  |  |  |  |  |
| SDP-1, Response to Loss of RCS Inventory During Shutdown |  |  |  |  |  |  |  |  |  |
| SDP-2 Response to Loss of RNS During Shutdown |  |  |  |  |  |  |  |  |  |
| K/A Category Totals: |  |  |  |  |  |  | Group Point Total: | | 18/6 |

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| Form 4.1-AP AP1000Examination Outline Page 3  Emergency and Abnormal Plant Evolutions—Tier 1/Group 2 (RO/SRO) | | | | | | | | | |
| E/APE # / Name | K1 | K2 | K3 | A1 | A2 | G | K/A Topic(s) | IR | # |
| A-311, Rod Control System Malfunction |  |  |  |  |  |  |  |  |  |
| A-308, Loss of Control Room AC |  |  |  |  |  |  |  |  |  |
| A-320, Loss of Circulating Water |  |  |  |  |  |  |  |  |  |
| A-302, Emergency Boration |  |  |  |  |  |  |  |  |  |
| A-327, Startup Feedwater System Malfunction |  |  |  |  |  |  |  |  |  |
| A-328, Malfunction of Feedwater Heaters and Extraction Steam |  |  |  |  |  |  |  |  |  |
| FR-I.1 Response to High Pressurizer Level |  |  |  |  |  |  |  |  |  |
| A-314, Fuel Handling Incident |  |  |  |  |  |  |  |  |  |
| A-304, Steam Generator Tube Leak |  |  |  |  |  |  |  |  |  |
| A-333, Main Turbine Malfunction |  |  |  |  |  |  |  |  |  |
| FR-Z.1, Response to High Containment Pressure |  |  |  |  |  |  |  |  |  |
| SDP-4, Response to Rising Nuclear Flux During Shutdown |  |  |  |  |  |  |  |  |  |
| SDP-5, Response to RCS Cold Overpressure During Shutdown |  |  |  |  |  |  |  |  |  |
| SDP-6 Response to Unexpected RCS Temperature Changes During Shutdown |  |  |  |  |  |  |  |  |  |
| A-306, Evacuation of Control Room |  |  |  |  |  |  |  |  |  |
| A-318, Condensate System Malfunctions |  |  |  |  |  |  |  |  |  |
| FR-C-2, Response to Degraded Core Cooling |  |  |  |  |  |  |  |  |  |
| FR-C.3, Response to Saturated Core Cooling |  |  |  |  |  |  |  |  |  |
| FR-H.2, Response to Steam Generator Overpressure |  |  |  |  |  |  |  |  |  |
| FR-Z.2, Response to Containment Flooding |  |  |  |  |  |  |  |  |  |
| FR-Z.3, Response to High Containment Radiation |  |  |  |  |  |  |  |  |  |
| FR-Z.4, Response to Low Containment Pressure |  |  |  |  |  |  |  |  |  |
| A-332, Turbine Trip Without Reactor Trip |  |  |  |  |  |  |  |  |  |
| ES-1.2, Post-LOCA Cooldown and Depressurization |  |  |  |  |  |  |  |  |  |
| A-321, Loss of Data Display and Processing System |  |  |  |  |  |  |  |  |  |
| FR-P.1, Response to Imminent Pressurized Thermal Shock Condition |  |  |  |  |  |  |  |  |  |
| A-340, Reactor Coolant Leak |  |  |  |  |  |  |  |  |  |
| FR-1.2, Response to Low Pressurized Level |  |  |  |  |  |  |  |  |  |
| FR-1.3, Response to Voids in Reactor Vessel |  |  |  |  |  |  |  |  |  |
| A-326, Feedwater System Malfunctions |  |  |  |  |  |  |  |  |  |
| A-303, Loss of Plant DC Electric Power or AC Instrument Power |  |  |  |  |  |  |  |  |  |
| A-348, Degraded Grid |  |  |  |  |  |  |  |  |  |
| K/A Category Totals: |  |  |  |  |  |  | Group Point Total: | | 8/4 |

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| Form 4.1-AP AP1000 Examination Outline Page 4  Plant Systems—Tier 2/Group 1 (RO/SRO) | | | | | | | | | | | | | | |
| System Name / Safety Function | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | IR | # |
| Reactor Coolant / 2, 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Steam Generator / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Normal Residual Heat Removal / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Passive Residual Heat Removal / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Passive Core Cooling / 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Component Cooling Water / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pressurizer Pressure Control / 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Automatic Depressurization / 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Reactor Trip System / 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Engineered Safeguards Actuation / 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Diverse Actuation / 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Passive Containment Cooling / 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Main Steam / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Main and Startup Feedwater / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| AC Electrical Distribution / 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Class 1E and Non 1E DC and UPS / 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Onsite Standby Power System / 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Service Water / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Compressed Air / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Containment System / 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Reactor Coolant Pump / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chemical and Volume Control / 1, 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| K/A Category Point Totals: |  |  |  |  |  |  |  |  |  |  |  | Group Point Total: | | 28/5 |

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| Form 4.1-AP AP1000 Examination Outline Page 5  Plant Systems—Tier 2/Group 2 (RO/SRO) | | | | | | | | | | | | | | |
| System Name / Safety Function | K1 | K2 | K3 | K4 | K5 | K6 | A1 | A2 | A3 | A4 | G | K/A Topic(s) | IR | # |
| Digital Rod Control / 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pressurizer Level Control / 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rod Position Indication / 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| In‑Core Instrument System / 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Containment Air Filtration / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Containment Hydrogen Control / 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Main Control Room HVAC / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Spent Fuel Pool Cooling / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Condensate / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Condenser Air Removal / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Main Turbine and Main Turbine Control / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fuel Handling / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Gaseous Radwaste / 9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Radiation Monitoring / 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Circulating Water / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fire Protection / 8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Steam Dump Control System / 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Nuclear Instrumentation System / 7 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Liquid Radwaste System / 9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| K/A Category Point Totals: |  |  |  |  |  |  |  |  |  |  |  | Group Point Total: | | 9/3 |

### Form 4.1-COMMON Common Examination Outline

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| Facility: Date of Exam: | | | | | | | | | |
| **Generic Knowledge and Abilities—Tier 3 (RO/SRO)** | | | | | | | | | |
| Category | K/A # | | Topic | RO | | | SRO-Only | | |
| IR | | # | IR | | # |
| 1.  Conduct of Operations | 2.1. | |  |  | |  |  | |  |
| 2.1. | |  |  | |  |  | |  |
| 2.1. | |  |  | |  |  | |  |
| 2.1. | |  |  | |  |  | |  |
| Subtotal | | | N/A | |  | N/A | |  |
| 2.  Equipment Control | 2.2. | |  |  | |  |  | |  |
| 2.2. | |  |  | |  |  | |  |
| 2.2. | |  |  | |  |  | |  |
| 2.2. | |  |  | |  |  | |  |
| Subtotal | | | N/A | |  | N/A | |  |
| 3.  Radiation Control | 2.3. | |  |  | |  |  | |  |
| 2.3. | |  |  | |  |  | |  |
| 2.3. | |  |  | |  |  | |  |
| Subtotal | | | N/A | |  | N/A | |  |
| 4.  Emergency Procedures/  Plan | 2.4. | |  |  | |  |  | |  |
| 2.4. | |  |  | |  |  | |  |
| 2.4. | |  |  | |  |  | |  |
| Subtotal | | | N/A | |  | N/A | |  |
| **Tier 3 Point Total** | | | |  | | **6** |  | | **7** |
| **Theory—Tier 4 (RO)** | | | | | | | | | |
| Category | | K/A # | Topic | | RO | | | | |
| IR | | | # | |
| Reactor Theory | | 6 |  | |  | | |  | |
| 6 |  | |  | | |  | |
| 6 |  | |  | | |  | |
| Subtotal | | | N/A | | |  | |
| Thermodynamics | | 6 |  | |  | | |  | |
| 6 |  | |  | | |  | |
| 6 |  | |  | | |  | |
| Subtotal | | | N/A | | |  | |
| **Tier 4 Point Total** | | | | |  | | | **6** | |

### Form 4.1-1 Record of Rejected Knowledge and Abilities

Refer to Examination Standard (ES)-4.2, “Developing Written Examinations,” Section B.3, for deviations from the approved written examination outline.

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| Tier/Group | Randomly Selected K/A | Reason for Rejection |
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