



Probabilistic Risk Assessment (PRA)

PRA is Critical to the Safe Operation of Complex and Hazardous Facilities

HukariAscendent has experience analyzing hazardous materials and operations through the application of accepted risk assessment methods and software tools. Experts working with HukariAscendent have established and maintained a “go-to first” reputation for use of risk and reliability techniques to enhance safety and operational performance of complex facilities such as nuclear power plants, chemical processing facilities, and hazardous material handling/storage facilities. Areas of expertise include:

- Probabilistic Risk Assessment (PRA)
- Shutdown PRA
- Fire PRA
- Data Analysis
- Human Reliability Analysis
- External Events Analysis
- Level 1, 2 and 3 Analysis
- Risk-Informed In-service Inspection
- Maintenance Rule Applications
- PRA Applications
- Individual Plant Examination (IPE) Submittals and Updates
- Internal Plant Examination of External Events (IPEEE) Submittals
- PRA Peer Review

These PRA resource Analysts and Engineers analyze product and system risk characteristics through the entire life cycle from concept phase through system operations. They use fully-tested and proven PRA tools and techniques along with extensive libraries of historical operations and failure data to quantitatively derive the frequency of occurrence of highly undesirable events or accidents.

HukariAscendent has experience providing professional safety analysts to both the commercial and government sectors and extends into nuclear licensing and engineering analyses, among other areas, needed to support full scope PRA and risk-informed applications. HukariAscendent’s engineering resources are adept with

many PRA tools and models including event tree analysis, fault tree analysis, data analysis, human reliability analysis, fire risk modeling, risk quantification, and results presentation. PRA software familiarity includes:

- CAFTA
- NUPRA
- FRANX
- Risk Spectrum
- RISKMAN
- Safety Monitor
- EPRI HRA Calculator
- SAPHIRE

Internal Event PRA

Capabilities to support nuclear power plants in development and maintenance of their risk assessment models include: Levels 1, 2 and 3 PRA; External Events PRA; Internal Fire and Floods PRA; Low-Power and Shutdown Risk Analysis.

External Event PRA

HukariAscendent personnel together with a database of subject matter experts can assist in addressing all external hazards including seismic, external flooding and high wind, including:

- Near-Term Task Force Recommendations
- Generic Issue – 199, Seismic PRA
- Post Fukushima requests meeting NRC’s Regulatory Guideline 1.200, Rev.2 expectations and the ASME/ANS PRA Standard
- Screening
- Seismic Margin and PRA
- External Flooding Analysis and PRA
- High Wind/Tornado PRA

Risk Informed Decisions Provide Safety Optimization and Prioritization

HukariAscendent’s Engineers and pool of available experts have extensive experience in developing PRA methods and risk assessments for clients in the commercial industry and government facilities.

HukariAscendent also has access to engineers with experience developing and maintaining “living” PRAs, which seem to be the trend, as well as contributing these PRA results for real-world decision-making processes. By analyzing product and system characteristics through the entire life cycle, from concept

phase through system operations, solid risk based decisions can be made. **HukariAscendent** also provides licensing resources needed to support risk-informed initiatives.

Area of Support

In addition to the PRA experience described above, **HukariAscendent's** available resources have experience in:

- Integrated Leak Rate Testing (ILRT) Interval Extension

- Graded Quality Assurance (QA)
- Severe Accident Management Analysis (SAMA) for License Renewal
- In-Service Testing (IST)
- Maintenance Rule
- Risk-Informed Technical Specification Amendments
- Mitigating Systems Performance Index (MSPI)
- Risk-Informed Prioritization
- Significance Determination Process (SDP)
- Justification for Continued Operation (JCO)

HukariAscendent Representative PRA Resources

<i>Resource</i>	<i>Years</i>	<i>Experience Summary</i>
GAT	32	Experience in power and shutdown pro PRA for numerous U.S. and foreign utilities, as well as experience in reliability and availability analysis, and turbine-generator maintenance. PRA experience in all aspects, including plant modeling, systems analysis, data, human reliability, Large Early Release Frequency (LERF) models, and external events. Recent experience includes PRA update, risk-informed in-service inspection (RISI) applications, Maintenance Rule, IPEEE analysis of fires and seismic events, and PRA applications for power uprate and design change evaluation.
GC	29	Versatile Senior PRA Engineer bringing a diverse experience portfolio spanning 29 years. PRA skills include fault tree/event tree/external events/human reliability analysis in support of the operations, maintenance, and licensing of the facility. Provided multiple roles as project manager, technical lead, and lead analyst in the areas of risk-informed applications and licensing amendments, seismic PRA, fire PRA, offsite hazards, low power shutdown risk, Maintenance Rule, and Reactor Oversight Program risk evaluations. Proven ability to impact team and corporate performance through applied integration of industry knowledge, technical expertise and exceptional communication skills that are integral to high performance and quality results.
AJU	40	Involved in projects for PRA, Risk Informed Decision Making and Risk Management for diverse applications in industry and in management of government facilities. Experience includes development of engineered systems, licensing of nuclear facilities, safety assessment and startup of nuclear facilities at Department of Energy (DOE) sites, management of critical assets and infrastructure at DOE sites, environmental management of nuclear and high hazard legacy wastes.
TD	23	Technical consultant for PRA for Fire Systems including sensitivity analysis and reviews under National Fire Protection Association (NFPA) Code 805. Has received Electrical Power Research Institute (EPRI) certification for risk (PRA) professionals. Has also been involved with Process Hazard Analysis (PHA) under 10 CFR 830. Has worked on both DOE and NRC projects including Licensing Basis Verification Project at Diablo Canyon, provided PHA support at DOE Pantex facility and Level 1, Fire PRA and External Events PRA for the Tokamak Fusion Reactor.
RDW	20	Previous experience as a PRA Engineer for Areva Nuclear Power supporting compliance for NFPA 805 transition. Provided input to fault tree analysis, event tree analysis, probabilistic human and equipment reliability assessments and PRA in accordance with the requirements of NUREG/CR-6850, EPRI/NRC Fire PRA methodology for Nuclear Power Facilities. Served as Subject Matter Expert in the application of fire dynamics tools, zone fire models (CFAST) and computational fire modeling software. This candidate has supported projects within the DOE and NRC arenas and is a Registered Professional Engineer in the State of Washington.
DAR	36	Over 34 years' technical experience as technical lead and project manager. Areas of expertise include project management, conducting PRA, IPEs, IPEEEs, seismic and fire PRAs, human reliability analyses (HRA), safety and risk informed applications for domestic and international commercial nuclear power utilities, DOE nuclear facilities, NASA and aerospace applications. Developed PRA tools such as SAPHIRE, and have performed PRAs using SAPHIRE, CAFTA, WINNUPRA, and RISKMAN. Recently completed two Seismic PRAs (one using CAFTA and one using RISKMAN) for a US Nuclear Utility