

Radiation Safety Information Computational Center (RSICC)

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Nuclear Data Evaluations for Reactor
Applications

ORNL is managed by UT-Battelle, LLC for the US Department of Energy

Radiation Safety Information Computational Center (RSICC)

Mission:

Serve as a unique nuclear software and data center for government agencies, universities and private industry by providing a centralized resource for quality-controlled modeling and simulation tools, processed nuclear data, and evaluated experimental benchmarks

Strategy:

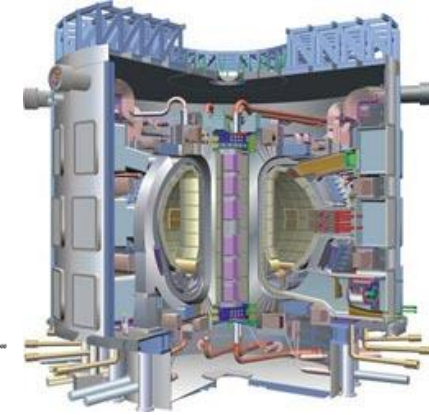
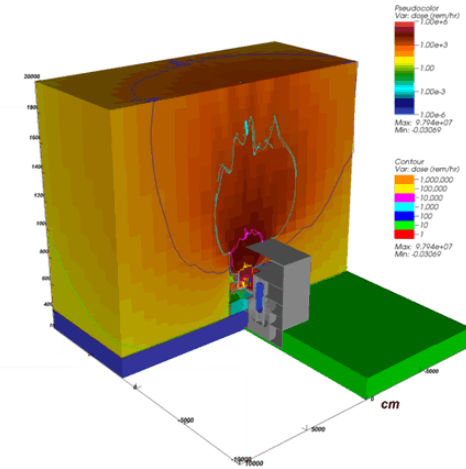
Engage domestic and international efforts that develop advanced M&S tools, evaluated nuclear data and benchmark experiments to make them available to our customers

Statistics:

Over 2,000 packages in the RSICC collection
Nearly 4,000 packages distributed annually
15,000+ active customers from 100+ countries
Operate secure CLOUD server to support international collaborations, e.g., ITER

Major sponsors:

NNSA Nuclear Criticality Safety Program, NNSA Non-Proliferation R&D, DOE Office of Nuclear Energy, Nuclear Regulatory Commission, NNSA Naval Reactors, DOE Office of Fusion

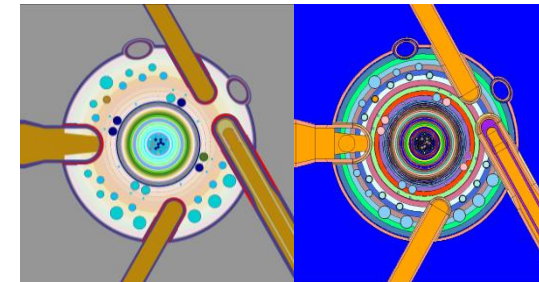


Radiation Source Terms

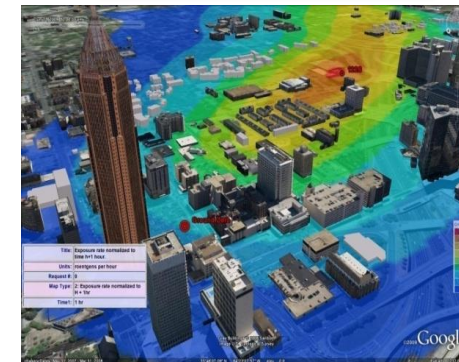
Fusion



Advanced Reactors



Nuclear Criticality Safety



Nuclear Security Modeling

Why is the export of nuclear modeling and simulation tools controlled?

U.S. export control regulations exist to balance the competing interest for U.S. competitiveness with U.S. national security concerns.

The U.S. Federal Government is committed to preventing the proliferation of nuclear weapons and ensuring the safe and secure deployment of nuclear technology for peaceful purposes

- Nuclear modeling and simulation tools (M&S) are enabling technologies that have dual uses in the design, development and analysis of nuclear technology across a broad range of applications for both peaceful and military purposes

RSICC's distribution of nuclear M&S tools falls under the regulation of the U.S. Federal Government

- **Department of Commerce: Bureau of Industry and Security (BIS)**
 - 15 CFR Parts 730-774 [dual use technology, Export Administrations Regulations (EAR)]
- **Department of Energy**
 - 10 CFR 810 (basis Atomic Energy Act of 1954) [technical assistance use and/or development]
- **Department of State: Directorate of Defense Trade Controls (DDTC)**
 - 22 CFR Parts 120-130 [International Traffic in Arms Regulations (ITAR) - Military items including nuclear weapons]
 - Nonproliferation based sanctions
- **Department of Treasury: Office of Foreign Assets Control (OFAC)**
 - Sanctions based controls: Cuba, Iran, North Korea, Syria, organizations, persons, etc.
- *Under all regulations citizenship(s) and location of the end user determines export regime and approval*

Department of Energy:

- Nuclear technology and technical assistance (directly or indirectly) in the development or production of any special nuclear material outside of the United States
- DOE has statutory responsibility for authorizing the transfer of nuclear technology, **including software**, and assistance to foreign atomic energy activities within the U.S. or abroad
 - Software is considered an enabling technology that can aid in proliferation activities
- Generally authorized activities with countries listed in Appendix A of 10 CFR 810 that do not involve sensitive nuclear technology
- Codes administratively controlled by the U.S. DOE: MCNP®, SCALE, RELAP, VERA, SOCKEYE, and any variant of these codes
- The export of software to non-Appendix A countries or their citizens requires a specific authorization
 - RSICC's secure cloud server as a pathway to address access concerns

Single User License Agreement

- Single User License Agreement
 - Restricts software to only be used by the Licensee
 - Restricts Licensee from redistributing the software or variants of the software to others
 - License is only valid while the individual is associated with the organization identified on the license agreement and for the approved end use
 - *Some end uses are not permissible under U.S. Federal regulations*
 - Licenses have always been linked with the customer's organization, location and end use – whether implicit, prior to Feb. 2015, or explicit, after Feb. 2015
 - RSICC is required to screen all organizations against denied parties list maintained by the Federal government to ensure compliance with U.S. export control regulations by the DOC, DOE, DOT, etc.
 - RSICC is required to review all end uses as not all end uses are permissible even if individuals are physically located and working in the U.S.
 - Prior licensing records have been utilized in several U.S. Federal government investigations of RSICC's customers including those by the DOE Inspector General, the FBI and the U.S. Attorney General's Office

Export Control Agreements

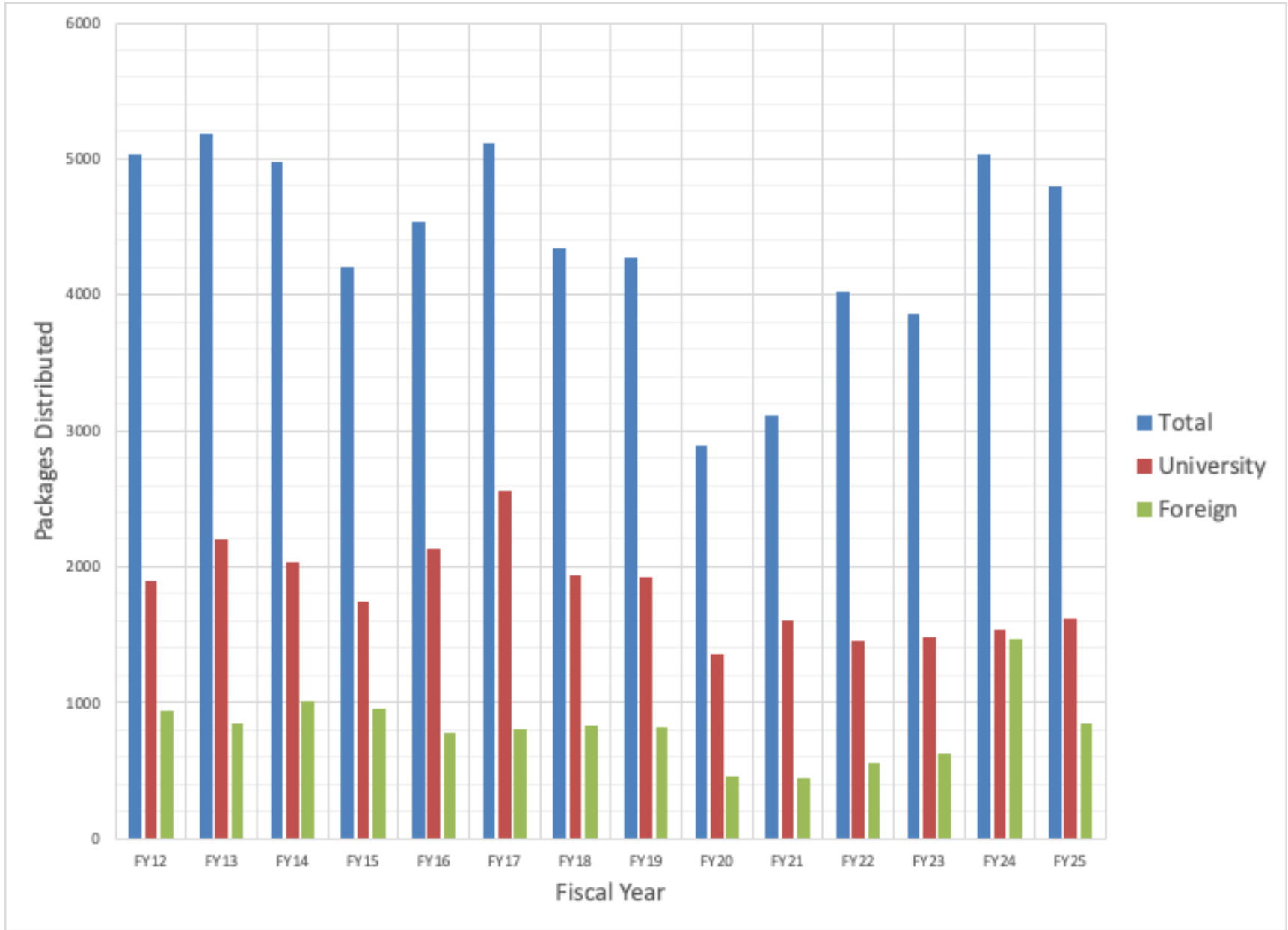
- Export Control Agreement
 - Restricts re-export of the software to other locations
 - Restricts use of the software for military or defense purposes unless authorized and approved by the U.S. Government for persons physically located in the U.S.
 - Requires the Licensee to assert that they are not identified on a denied persons' lists or a citizen of a country identified on a parties' lists
 - Identifies the export control jurisdictions for the software
 - Not all end uses are permissible even if the individual is in the U.S. and working for a U.S. organization per U.S. Code of Federal regulations (10 CFR 810)
 - A specific authorization by the U.S. Secretary of Energy is required for engaging in or providing technology for activities listed in 10 CFR 810 (810.7(C)) to foreign persons.
 - Uranium isotope separation (enrichment), plutonium isotope separation, etc.
 - Fabrication of nuclear fuel containing plutonium
 - Heavy water production
 - Development, production or use of a “production” accelerator-driven subcritical assembly (an accelerator driven system for production of weapons grade materials)
 - Development, production or use of a “production” reactor
 - Reprocessing of irradiated nuclear fuel or targets containing special nuclear material

RSICC Cost Recovery

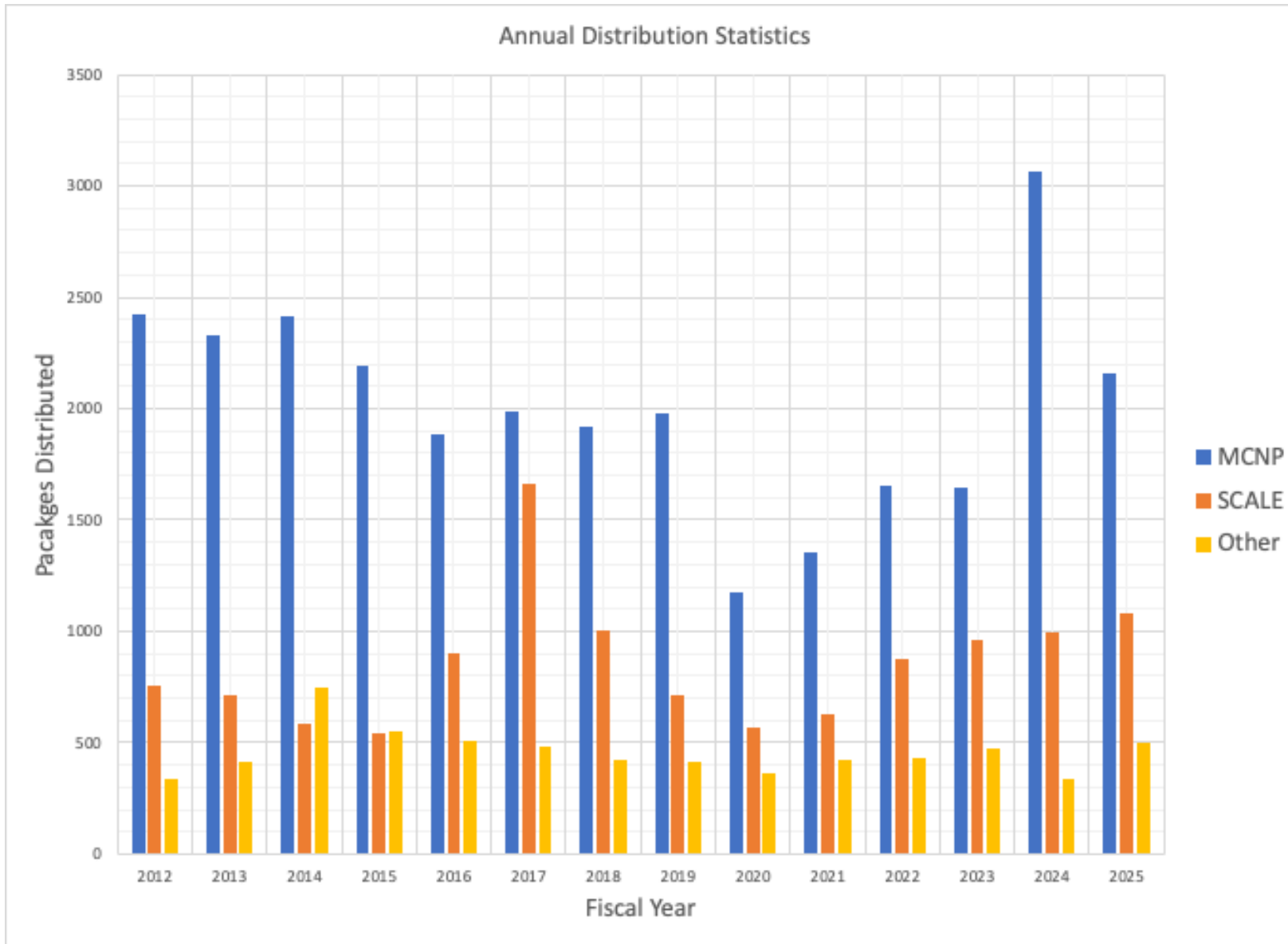
- U.S. Universities
 - Prior to 2010 all university programs had to pay a cost recovery fee
 - From 2010 to 2013 cost recovery fee was only waived for select nuclear engineering departments
 - After January 2013 cost recovery fee waived for all nuclear engineering departments and programs at U.S. universities
- Historically cost recovery fee varied based on number of requests, center's costs of operations, and funding support from Federal government and others
 - Fees were waived for individuals supported by RSICC's sponsors
 - FY2020: \$1,000 general approval, \$1,250 Federal approval, \$1,823.30 CLOUD approval
 - FY2021 – FY2023: \$950 general approval, \$1,188 Federal approval, \$1,746 CLOUD approval
 - FY2024 – FY2025: \$840 general approval, \$1,056 Federal approval, \$1,576 CLOUD approval
 - FY2026: \$940 general approval, \$1,1820 Federal approval, \$1,750 CLOUD approval
- **NEA Data Bank Member Countries: 2026**
 - **U.S. Department of Energy Office of Nuclear Energy finalized agreements with the NEA Data Bank to support RSICC to provide cost-free access to DOE controlled software for approved organizations that are members of the NEA Data Bank subject to the availability of funding.**
 - **Approved organizations must be members of the NEA Data Bank that are government agencies, national research institutes, and universities.**
 - **The cost-free access started in June 2026.**

RSICC's customers and software distribution

Decrease in RSICC's Distributions in FY20 due to COVID



RSICC's Most Demanded Software Packages



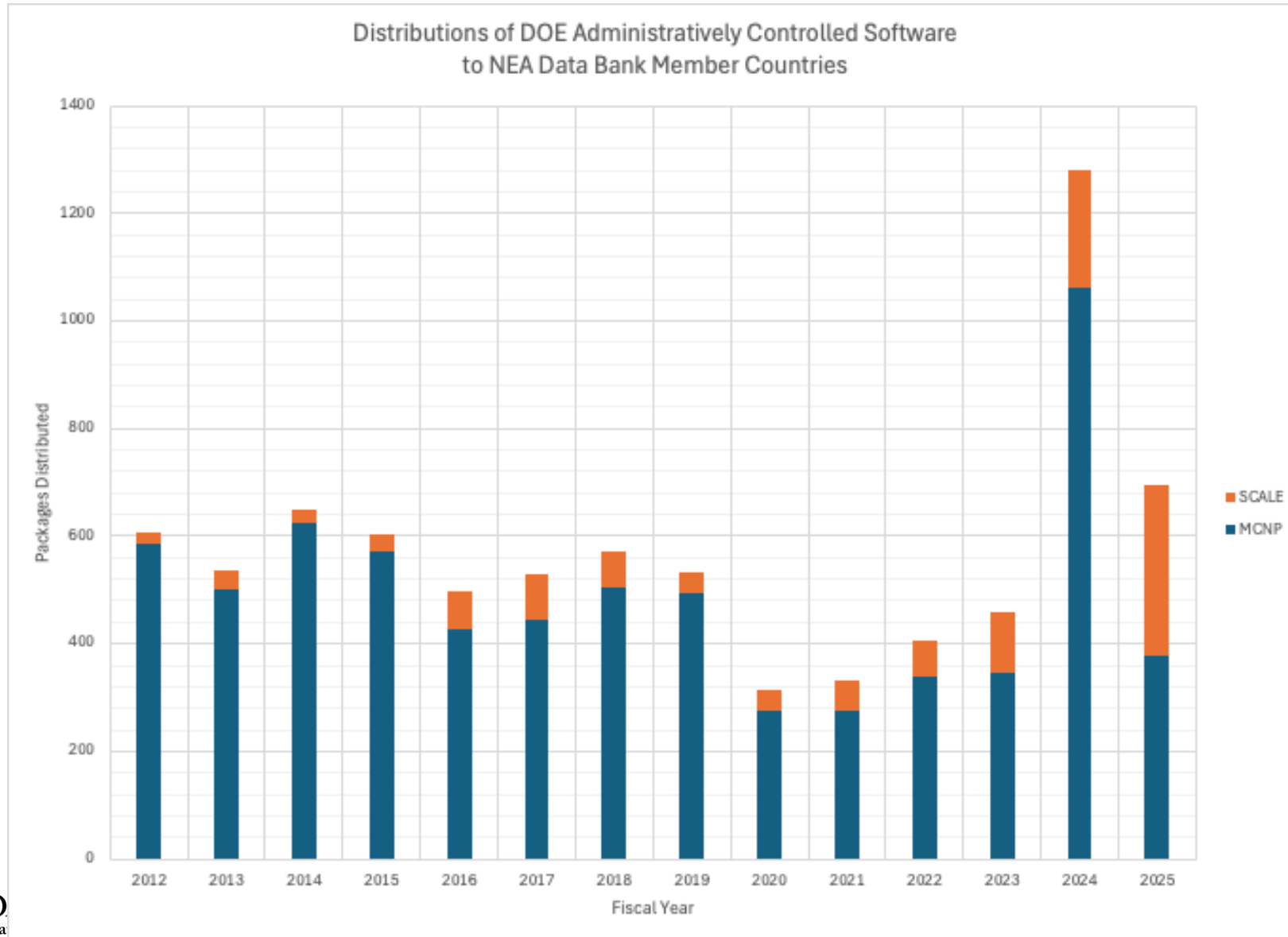
- Increase in software demand corresponds to:
 - Growth in enrollments in nuclear engineering departments and their greater dependence on modeling and simulation tools
 - Releases of new versions of codes
- Over 28.7K copies of MCNP® and over 12.3K copies of SCALE distributed since 2010

RSICC's Commonly Requested Software Packages

MCNP and SCALE are most in-demand packages

Fiscal Year	MCNP	SCALE	ADVANTG	SERPENT	VESTA	SWORD	PENELOPE	RELAP	SAPPHIRE	VARSKIN	RASCAL
2010	931	588	0	27	0	26	20	20	0	27	0
2011	1828	818	0	34	1	60	23	15	0	118	5
2012	2422	760	0	47	12	43	43	27	0	138	25
2013	2331	713	0	98	21	29	19	62	0	115	65
2014	2413	589	0	104	15	35	18	42	53	113	361
2015	2196	540	53	117	8	26	23	35	113	48	124
2016	1888	901	101	131	6	34	26	16	115	38	35
2017	1991	1663	64	169	3	30	23	22	97	30	32
2018	1917	1001	67	138	5	17	19	19	113	17	31
2019	1981	712	89	136	4	29	14	9	84	25	17
2020	1171	564	107	134	3	10	6	4	62	11	24
2021	1354	626	118	161	5	10	4	10	82	8	21
2022	1657	872	137	133	5	10	3	5	94	16	31
2023	1647	963	179	190	4	14	5	6	46	16	8
2024	3061	997	114	147	5	10	8	5	29	14	7
2025	2155	1085	222	176	1	1	6	25	44	20	7

RSICC's Software Distribution of DOE Controlled Codes to NEA Data Bank Member Countries



- Argentina
- Austria
- Belgium
- Bulgaria
- Czechia
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Italy
- Japan
- Korea
- Mexico
- Netherlands
- Norway
- Poland
- Portugal
- Romania
- Slovak Republic
- Slovenia
- Spain
- Sweden
- Switzerland
- Turkey
- U.K.

Obtaining Software from RSICC

Registering with RSICC

- Customers must provide the following information when registering with RSICC
 - Full name including first, last, and middle name (if applicable)
 - Organization name and postal address (comments can be included to have the software delivered to another location within the same country for remote workers)
 - Complete citizenship information and residency status
 - An email address associated with the individual's organization (Gmail, Hotmail, etc. not acceptable)
- Customers can register as "SELF" employed
- Contractors that support multiple organization should register under their employer and not the organization with whom they are contracting
- When an individual changes their organization, they must update their registration with RSICC and **dispose** of previously obtained software
 - The license agreements are specific to the organization, location, end use, and customer

Requesting Software from RSICC

- Customers must select the code that they wish to obtain
 - Older versions of software can be requested by selecting the current version and including a comment specifying the version that is needed
- Customers must provide a complete end use statement
 - Describe the type of calculations (criticality safety, dose, reactor physics, etc.)
 - Describe the application (advanced reactor design, fuel storage, medical physics, spent fuel storage, etc.)
- Customer must declare any possible use of the code for fuel cycle activities as these may not be permissible under 10 CFR 810.7 (c)
- End uses for defense, maritime nuclear propulsion, and space applications are also restricted or prohibited unless directly supported by the U.S. Federal government
- Examples of acceptable end use statements
 - The MCNP® code will be used to perform criticality safety calculations associated with the storage and transport of commercial reactor fuel
 - The MCNP® code will be used to perform criticality calculations on integral benchmarks of uranium and plutonium systems for evaluation of nuclear data

Other Customer Recommendations

- **Server/cluster Operations by Organizations**
 - Requires all system administrators to be approved because “access” is the primary concern with software
 - Requires primary system administrator to track all users and report to RSICC
 - RSICC maintains records of server/cluster installation
- **Commercial CLOUD operations**
 - Use of commercial CLOUD services is prohibited outside of the U.S.
 - Commercial CLOUD services in the U.S. must meet DOD IL4 requirements for installation of RSICC software
- **Single User Multi-Organization (SUMO) License**
 - Legal mechanism to allow individuals to be licensed to use the software in more than one country
 - Requires a point-of-contact in other countries to provide access to RSICC software
 - Key for international organizations and international collaborations

Summary

- Over its 60-year history RSICC has served as a primary software and data distribution center for nuclear science and technology applications in the U.S.
 - RSICC is the primary distributor of MCNP®, SCALE, ADVANTG and NRC legacy codes
 - RSICC has distributed over 200,000 software and data packages in compliance with ever-changing U.S. Federal regulations
- RSICC' registration and request processing procedures ensure compliance with U.S. Federal regulations
- RSICC's operations provide a cost-effective means to distribute software utilized across the nuclear enterprise and supports the training and education of the next generation of nuclear engineers and scientists.
- RSICC staff are dedicated to assisting its customers with their software needs