



Nuclear Energy Success Story



Managing Power Plant Data in Compliance with the Nuclear Regulatory Commission

The primary mission of the Nuclear Regulatory Commission (NRC) is to protect the public health and safety, and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities.

The NRC also regulates these nuclear materials and facilities to promote common defense and security. Because of the obvious nature of nuclear power generation, NRC regulation standards are very high. In order to meet the requirements set forth by the NRC, major nuclear energy providers turn to storage system specialists such as Data Archive Corporation of Massapequa Park, New York, to implement systems that meet the specific regulations of the NRC.

In December 2000, Paul Greene from Data Archive Corporation was contacted by a major nuclear energy management company seeking a solution to manage data used to monitor its nuclear energy generators in two locations. There were several hurdles to overcome with this solution.

First, the solution needed to cover both coasts of the United States. One generator is near San Jose, CA, and the other is near Wilmington, NC.

Second, the company needed to comply with specific NRC regulations for data storage and retention. The NRC uses the accepted practices for the collection, storage, and maintenance of Quality Assurance records for nuclear power plants as outlined by the American National Standards Institute (ANSI) N45.2.9-1974, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants," as endorsed by RG 1.88, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records," and the ANSI/American Society of Mechanical Engineers, ANSI/ASME-NQA-1, 1983 edition, "Quality Assurance Program Requirements for Nuclear Facilities," as endorsed by RG 1.28, "Quality Assurance Program Requirements (Design and Construction)." In order to meet the storage regulations as laid out by the NRC, Data Archive Corporation had to construct a storage management system that met the following criteria:

- Optical disk must be used to store archive data because it does not allow the deletion or modification of the recorded image.
- Each image must be written to two optical disks.
- Each image must be verified to ensure that the image is legible on both disks.
- One optical disk is maintained with the imaging system for on-line retrieval
- The second disk must be stored in records storage meeting the requirements of ANSI N45.2.9-1974 for single copy storage or in a separate remote location.
- Ensure permanent retention of the records by copying images onto a new optical disk before the manufacturer's certified useful life is exceeded. This process should include verification of the copy.
- Periodic and random inspections of the images stored on the optical disks must be performed to verify that no degradation of the image has occurred.



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In order to meet the physical record storage requirements of the NRC, Data Archive Corporation recommended Plasmon, a leading manufacturer of storage devices based on write-once optical media (WORM). Write-once optical media was chosen because it meets the requirement for revision save recorded images, as well as preventing images from being deleted from the system. The solution consists of a total of four Plasmon optical libraries. Two libraries were installed at the California location, and the other two at the North Carolina location. One library at each location is considered the primary storage library, which hosts the information generated at that particular site, while the second library at each site serves as the mirror for the alternate location, providing full data replication with real-time failover in the event of a system failure or disaster.

In order to meet the data management requirements, Data Archive Corporation recommended QStar's Data Director software to manage the libraries, and provide storage connectivity for the imaging system. Data Director's archiving functionality manages the storage of the images onto write-once optical media to ensure that the record retention requirements of the NRC are met. In addition, the mirroring functionality within Data Director manages both the archive and the requirement to make two identical copies of each image. It also provides the ability to record a copy to the remote locations on either coast. In this manner, QStar is able to mirror the Plasmon libraries from each primary site to the secondary site, thereby providing a redundant storage location for the primary site on the opposite coast. In addition, Data Director verifies images written to each disk and creates an identical copy to comply with the NRC regulations. Data Director also manages scheduled copies when records need to be migrated to new media prior to expiration.

In October 2003, a third Plasmon library was added in Tokyo, Japan, and mirrors across the Pacific Ocean back to a secondary optical library in North Carolina.

As new technology has been developed, Data Archive Corporation is upgrading the sites to Plasmon Ultra Density Optical (UDO) technology. UDO has been selected because it stores 30GB of data on a single optical disk, further increasing the amount of data stored on a single media and lowering the overall cost of storage, while maintaining the requirement for data storage and retention as set forth by the NRC.

All three sites utilize Sun Microsystem's Solaris operating system, and Network Appliance Filers as a front end NFS mounted cache for the optical libraries. QStar Data Director incorporates a cache mechanism that manage reads and writes in a fast and efficient manner, such that if the requested information is in cache, the request does not have to access the optical library.

In summary, Data Archive Corporation implemented an information archive solution for a major provider of nuclear energy utilizing Plasmon optical libraries and QStar library management software. The solution provides fully redundant mirroring between the two coasts of the United States, in addition to a site in Japan which mirrors to the East Coast of the United States. Each site creates data and then replicates it to another site to comply with Nuclear Regulatory Commission regulations for data storage and retention.

QStar Technologies, Inc.
2175 West Highway 98
Mary Esther, FL 32569
Phone: 850-243-0900
Fax: 850-243-4234
Info@qstar.com

QStar Technologies Europe
Viale Italia, 12 - 20094
Corsico (Milano) Italy
Phone: +39 0245171.1
Fax: +39 0245101745
Info@qstar.it

QStar Technologies UK
Clare House
High street
Frimley, CAMBERLEY
Surrey GU16 7HJ - UK
Phone: +44 01276.418.237
Fax: +44 01276.691.090



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