# San Onofre Spent Fuel Inventory

**January 3, 2014**

## Spent Fuel Pool (SFP)

- **HIGHEST BURNUP >55 GWd/MTU with 4.348% U-235:** An unofficial copy of the San Onofre SFP inventory shows the two fuel assemblies with highest burnup are from Unit 3. They both have 4.348% U-235 initial enrichment and were added to the pool 10/12/2008. *Request for official inventory is pending*.
  - Fuel Assembly S3P548, **55.0850 GWd/MTU**
  - Fuel Assembly S3P545, **55.0060 GWd/MTU**
  - All assemblies are under the 4.8% maximum allowed initial enrichment
- **TOTAL: 2776 spent fuel assemblies (SFA) in the pools.**[1]
  - 1426 SFA (1318 + 108 with zero burnup) in U2 SFP.
  - 1350 SFA in U3 SFP.
- **The last fuel loaded into the pools** from Unit 2 on July 18, 2013[2] and from Unit 3 on October 5, 2012.[3]
- **TOTAL: 1115 HIGH BURNUP spent fuel assemblies are in the pools.**[4] However, SFA 40 to <45 GWd/MTU should probably be treated as high burnup.[5] *This total doesn't include those.*
  - 570 high burnup SFA in U2 SFP
  - 545 high burnup SFA in U3 SFP

## Dry Cask Storage (DCS)

- **TOTAL: 42 loaded dry storage canisters,** per 2011 NRC San Onofre ISFSI inspection report,[6] this includes about **800 Unit 2 and 3 fuel assemblies and 400 Unit 1 fuel assemblies**.[7]
- **All the dry stored fuel is 30+ GWd/MTU.** The DOE states fuel as low as 30 GWd/MTU shows similar problems to high burnup fuel. One canister is 29.5 GWd/MTU, but burnup is rounded up to the next whole number for storage purposes.
- **8 HIGH BURNUP fuel assemblies in dry casks**.[8]
  - 1 placed in the pool 8/17/1991. Moved to dry storage 2/28/2007. (~15.5 years in pool)
  - 2 placed in the pool 7/22/1995. Moved to dry storage 4/7/2008. (~12.75 years in pool)
  - 5 placed in the pool 1/2/2001. Moved to dry storage 6/30/12. (~11.5 years in pool)
  - Unknown if high burnup fuel assemblies were canned.
- **95 FAILED (DAMAGED) fuel assemblies are stored in dry casks.**[9] This is higher than normal and the NRC says they are not sure why.

  **Unit 1**
  - 19 canisters; 9 with 27 failed fuel assemblies; one canister with Greater-than-Class-C (GTCC) waste removed from the internals of reactor Unit 1.
  - Burnup from 34.9 to 43.2 GWd/MTU, with maximum initial fuel enrichment of 4.02%.

  **Unit 2**
  - 11 canisters; 4 with 46 failed fuel assemblies.
  - Burnup from 38.3 to 48.3 GWd/MTU, with maximum initial fuel enrichment of 4.49%.

  **Unit 3**
  - 12 canisters; 2 with 22 failed fuel assemblies.
  - Burnup from 29.5 to 50.1 GWd/MTU, with maximum initial fuel enrichment of 4.6%.

- **Unit 1:** 24-assembly Model 24PT1-DSC[10] dry storage canister is allowed a maximum 4 failed fuel assemblies per canister and is not licensed for high burnup fuel.
- **Unit 2 and 3:** 24-assembly Model 24PT4-DSC[11] dry storage canister is allowed 12 maximum failed fuel assemblies per canister and is licensed for high burnup fuel for a maximum 20 years.

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- **HIGH BURNUP STORAGE AND TRANSPORT:** There is no NRC approval for over 20 years for high burnup fuel canisters, due to insufficient data about high burnup fuel safety.[12] There is no NRC approval for transport of high burnup fuel.[13]

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[1] Web page: Update: Decommissioning of the San Onofre Nuclear Plant, Q&A with San Onofre Site Vice President Tom Palmisano, accessed 1/3/2013. http://www.songscommunity.com/decommissioning-updates.asp

[2] SCE Monthly Report to CPUC in Compliance with I. 12-10-013, August 1, 2013. http://on.sce.com/KnHa2G

[3] SCE to NRC Docket No. 50-362 Permanent Removal of Fuel from the Reactor Vessel San Onofre Nuclear Generating Station Unit 3, June 28, 2013. http://pbadupws.nrc.gov/docs/ML1318/ML13183A391.pdf

[4] SCE response to WEM data request, CPUC WEM-SCE-007, August 23, 2013, Page 4. http://sanonofresafety.files.wordpress.com/2013/06/wem-sce-007-q-40-a-q-44-d-10-4-2013.pdf

[5] NRC June 20, 2007 transcript, Advisory Committee on Nuclear Waste and Materials 180th meeting, Volume II, Page 70, EISINGER: "There is nothing holy about 45 gigawatt days per metric ton. Maybe it's 42, maybe it's 48. But that's -- in that general burnup range is where many of the properties of the fuel start going from a linear low value to an exponential value. There's a change in the shape of the curve where things get a little dicier." http://www.nrc.gov/reading-rm/doc-collections/acnw/tr/2007/nw062007.pdf

[6] NRC San Onofre Nuclear Generating Station – Independent Spent Fuel Storage Installation (ISFSI) Inspection Report 050-206/2011-011; 050-361/2011-011; 050-362/2011-011; 072-041/2011-001, May 20, 2011, Attachment 2, Loaded Casks at the SONGS ISFSI. http://pbadupws.nrc.gov/docs/ML1114/ML111430612.pdf

[7] Web page: Update: Decommissioning of the San Onofre Nuclear Plant, Q&A with San Onofre Site Vice President Tom Palmisano, accessed 1/3/2013. http://www.songscommunity.com/decommissioning-updates.asp

[8] SCE response to WEM data request, CPUC WEM-SCE-007, August 23, 2013, Page 5. http://sanonofresafety.files.wordpress.com/2013/06/wem-sce-007-q-40-a-q-44-d-10-4-2013.pdf

[9] NRC San Onofre Nuclear Generating Station – Independent Spent Fuel Storage Installation (ISFSI) Inspection Report 050-206/2011-011; 050-361/2011-011; 050-362/2011-011; 072-041/2011-001, May 20, 2011, Page 11. http://pbadupws.nrc.gov/docs/ML1114/ML111430612.pdf

[10] Appendix A to Certificate of Compliance No. 2029 Technical Specifications for the Advanced NUHOMS® System Operating Controls and Limits. http://pbadupws.nrc.gov/docs/ML0515/ML051520131.pdf

[11] Ibid. http://pbadupws.nrc.gov/docs/ML0515/ML051520131.pdf

[12] NRC Division of Spent Fuel Storage and Transportation, Interim Staff Guidance-24, Revision 0, The Use of a Demonstration Program as Confirmation of Integrity for Continued Storage of High Burnup Fuel Beyond 20 Years. http://pbadupws.nrc.gov/docs/ML1305/ML13056A516.pdf

[13] NRC Spent Fuel Project Office Interim Staff Guidance - 11, Revision 3, Cladding Considerations for the Transportation and Storage of Spent Fuel. http://www.nrc.gov/reading-rm/doc-collections/isg/isg-11R3.pdf