OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

Date Printed: Feb 28, 2013 15:27

PAPER NUMBER: LTR-13-0183 **LOGGING DATE:** 02/28/2013

ACTION OFFICE: EDO

To: Leeds, NRR
cys: OEDO
RIV
Merzke, OEDO

AUTHOR: Don Leichtling

AFFILIATION:

ADDRESSEE: Chairman Resource

SUBJECT: Media Alert - Chart of three modes of San Onofre Unit 2 operation, 100%, 70% and MSLB with multiple tube failures

ACTION: Appropriate

DISTRIBUTION: SECY to Ack.

LETTER DATE: 02/27/2013

ACKNOWLEDGED Yes

SPECIAL HANDLING:

NOTES:

FILE LOCATION: ADAMS

DATE DUE: **DATE SIGNED:**

Template: SECY-017

E-RIDS: SECY-01

Joosten, Sandy

From: Capt.D [captddd@gmail.com]
Sent: Wednesday, February 27, 2013 7:40 PM
To: Capt D
Subject: Media Alert: Chart of three modes of Unit 2 operation, 100%, 70% and MSLB with multiple tube failures.

The DAB Safety Team: February 27, 2013

Media Contact: Don Leichtling (619) 296-9928 or Ace Hoffman (760) 720-7261

Charts: San Onofre Unit 2 Modes Of Operation

Table 1 – San Onofre RSGS Design and Operational Data

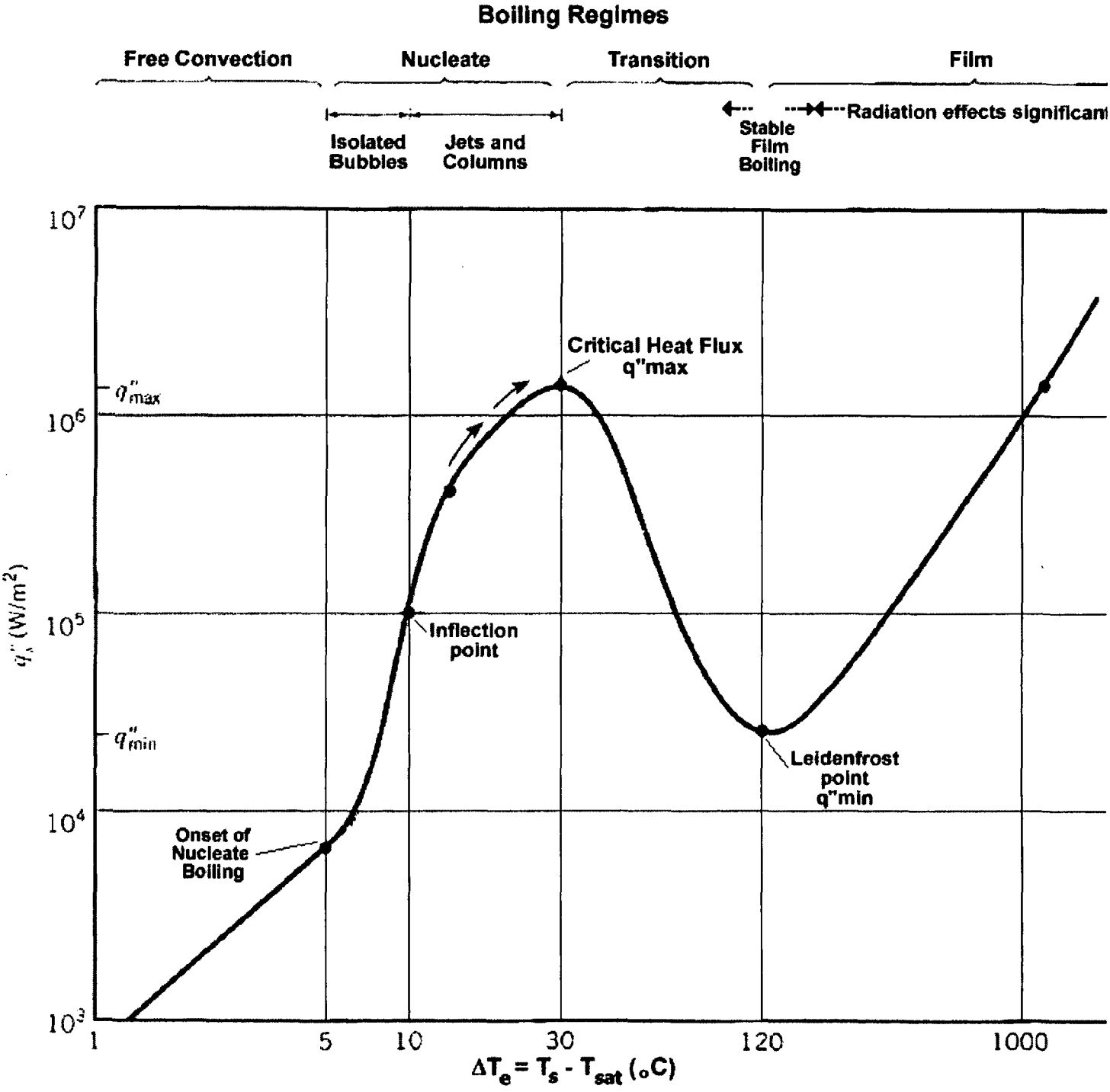
Design and Operational Parameters which caused FEI, FIRV and MFE	U2 RSGs @100% Power	U2 RSGs @70% Power	**MSLB** with Multiple 8 Ruptures @600 gpm **U2 RSGs** @0% Power
(1) Reactor Thermal Power, MWt	**1729**	**1215**	**0 (Reactor Trip)**
(1A) Unit Electrical Generation, MWe	1183	?	N/A
(2) Number of Tubes	9727	9727	12,580
(3) Average Length of Heated Tubes, inches m	729.56	729.56	729.56
(4) Heat Transfer Area, ft2	116,100	116,100	116,100
(5) Tube Wall Thickness, inches	0.043	0.043	0.043
(5A) Tube Diameter, inches	0.75	0.75	0.75
(5B) Tube Pitch, inches	1.0	1.0	0.87
(5C) Tube Array	Triangular	Triangular	Triangular/Square
(5D) Tube Index	1.33-1.43	1.33 – 1.43	1.52-1.67
(5E) Tube to tube clearance, inches	0.25	0.25	?
(5F) Nominal Gap between tube and AVB", cold, inches	0.002	0.002	0.003
(5G) Nominal Gap between tube and AVB", Hot, inches	0	0	0
(5H) Nominal Gap, Manufacturing Dispersion, inches	N/A	N/A	N/A
(5I) Tube Wall Thickness/Tube Diameter Ratio	0.057	0.057	0.057
(5J) Average Heated Tube Length/Tube Diameter Ratio	973	973	973
(6) Reactor Coolant Flow (at cold leg temperature), , Million lbs./hour	79.8	**78.2**	0 (RCS Pump Trip)
(6A) Reactor Coolant Operating Temperature (Thot), 0F	598	591	591
(6B) Reactor Coolant Operating Temperature (Tcold), 0F	541	551	551
(7) RSG Operating Pressure (@100% power), psia	892	946	ATM
(8) Steam Operating Temperature (@ 0% power), 0F	531	538	212
(8A) Steam Flow, Million lbs./hour	7.6	5.1	Feedwater Inventory to Environment in 5 -15* Minutes – SG Empty
(8B) Feed-water Inlet Temperature , 0F	442	407	N/A
(9) Feedwater Flow, Million lbs./hour	7.6	5.1	0 (Feedwater Pumps Trip)
(10) Steam Quality, %	90%	36%	> 90%
(11) Void Fraction, %	98.5%	92.6%	100%
(11A) Maximum Gap Fluid Velocity, feet/second	25.1	12.6	> 50

(11B)Secondary fluid density, lbm/cubic feet	7	12	< 7
(12) Reactor Coolant Volume, ft3	2003	2003	15,000 gallons RCS Tube Inventory contained in tubes escapes to the Environment in 5 -15* Minutes
(13) Circulation Ratio	3.3	4.9	0
(13A) Down-comer Feed-water Flow, Mlbs./hour	24.8	24.8	0
(14) Delta Te = (TS, 6A) – (TSAT, 7A) , 0F	67	53	**~400**
Fluid Elastic Instability	NO	NO	**YES (Film Boiling) Significant Radiation****
Flow-induced Random Vibration	YES	YES	**YES**
Mitsubishi Flowering Effect	YES	NO	**YES**
Flashing Feedwater Jet Impingement Forces on Tubes	N/A	N/A	**YES**

Compilation of data based on Publicly Available Documents (e.g., Westinghouse Operational Assessment, SCE Unit 3 Root cause Evaluation, http://www.efunda.com/materials/water/steamtable_sat.cfm, etc.)

* No Operator Action assumed in 15 minutes

** Radiation will exceed SCE FSAR limits. Offsite releases probability due to multiple tube ruptures will exceed assumed Core Damage Probability (CDP) and Large



Boiling Curve for water at 1 atm.
Surface heat flux q" as a function of excess temperature $\Delta T_e = T_s - T_{sat}$

http://en.wikipedia.org/wiki/Film_boiling

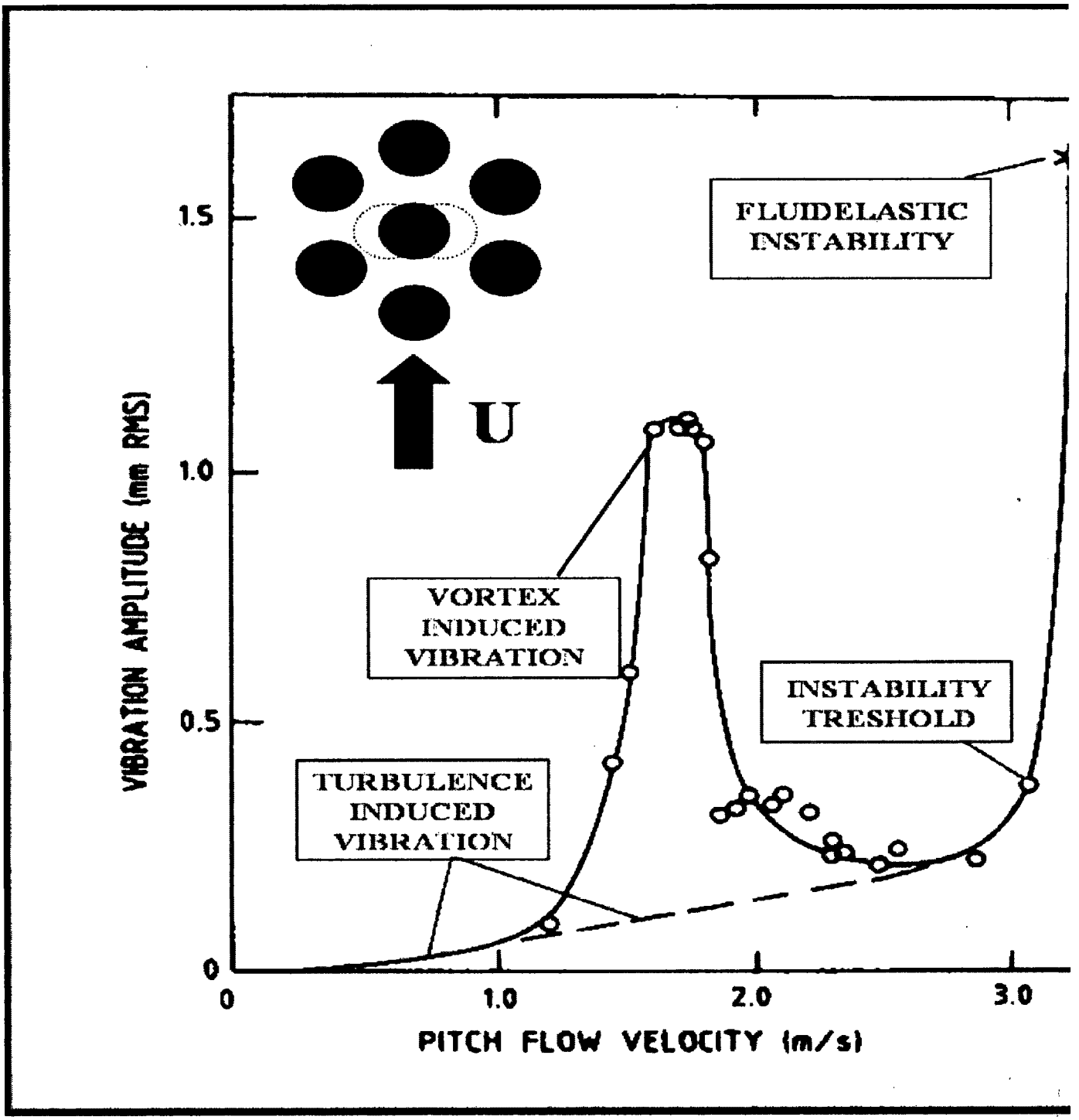


Figure 1 – Vibrations amplitude as a function of flow pitch velocity for a flexible cylinder in a rigid c from Pettigrew et al. 1991). The cylinder is free to vibration in the cross-flow direction.

Reference: Violette, R., Pettigrew, M.J., Mureithi, N.W. (2006). Fluidelastic Instability o Tubes Preferentially Flexible in the Flow Direction Subjected to Two-Phase Cross Flow. *of the ASME, Journal of Pressure Vessel Technology, 128(1)*, p. 148-159.

These charts will be posted on the web at this link: DAB Safety Team Documents.
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The DAB Safety Team: Don, Ace and a BATTERY of safety-conscious San Onofre insiders plus industry experts from around the world who wish to remain anonymous. These volunteers assist the DAB Safety Team by sharing knowledge, opinions and insight but are not responsible for the contents of the DAB Safety Team's reports. We continue to work together as a Safety Team to prepare additional: DAB Safety Team Documents, which explain in detail why a SONGS restart is unsafe at any power level without a Full/Thorough/Transparent NRC 50.90 License Amendment and Evidentiary Public Hearings. For more information from The DAB Safety Team, please visit the link above.

Our Mission: To prevent a Trillion Dollar Eco-Disaster like Fukushima, from happening in the USA.