DRESSER-RAND
Electric Machinery
Terry
Turbodyne

Steam Turbine, Motor & Generator Division
37 Coats Street
P.O. Box 592
Wellsville, NY 14895-0592
716/593-1234 Telex: 91534

March 24, 1993

U.S. Nuclear Regulatory Commission
Vendor Inspection Branch
Division of Reactor Inspection and License Performance
Office of Nuclear Reactor-Regulation
11555 Rockville Pike
Rockville, MD 20852

Attention: Leif J. Norrholm

Reference: Terry Type GS and ZS
Auxiliary Feed Pump Drivers/RCIC
Governor Valve Stem

Gentlemen:

We attached hereto a copy of a letter dated March 18, 1993 which was sent to the plants listed.

We trust that the enclosed is self explanatory; however, if we can [illegible] of further assistance, please do not hesitate to contact us.

Best Regards,

Carlton M. Slater
Service Engineer

CMS/wte

Attachment

010101

IE19
1/1

March 18, 1993

Gentlemen:

On all Terry model ZS and GS turbines using the 2 1/2" veeport and 3" Venturi governor valves, the valve stems are made of nitrided 410 stainless steel with carbon rings for packing.

There has been a few nuclear plants exhibiting corrosion related valve stem binding. It is agreed that valve stems of this construction are susceptible to corrosive attack during prolonged exposure to an environment of stagnant oxygenated water.

The design selection is made with expectation (backed up by very extensive experience) that the residual corrosion resistance of nitrided 410 is adequate in a typical steam turbine valve stem environment. The fact there are thousands of steam turbines with nitrided 410 valve stems around the world, including many of them in standby service provides a strong testimony to the expectation. Also, there are only eight out of 140 nuclear plants on our installation list which have reported problems with corrosion related valve stem bindings.
Therefore, this suggests strongly that a reasonably non-corrosive valve stem environment is being maintained by the other plants. There is a similarity to these turbines in nuclear plants. This similarity is, they all have extended periods of idle standby status.

The plants that are having this corrosion environment problem are not adequately draining the unit and/or have corrosive water chemistry in the steam. This water is stagnating in the valve stem packing gland (L-gland). The The real solution is to have adequate drainage and eliminate the corrosive environment. However, some of these plants have concluded that they are unable to assure a dry and non-corrosive control valve environment.

Accordingly, they have identified a need for a valve stem with higher corrosion resistance - specifically a stem with chrome plating applied over a layer of electroless nickel. Attached is a list of these plants and their experiences. After reading this list one can see that there is no selection of valve stem materials which, can by itself, prelude the possibility of surface deterioration or assure indefinite freedom from binding.

Because Dresser-Rand has a high regard for customer satisfaction, there is a willingness to supply nuclear grade chrome plated valve stems to the plants that can not assure a dry and corrosive free environment and are experiencing a corrosive related binding problem. That means not all plants fit this need and for them, no change is required.

Governor valve stems do not have a infinite life span. Based on data on the number of the 410 nitrated valve stems used, the average service life is 5+ years. This suggests that these valve stems are replaced on a preventative basis at normal inspection intervals, not because of binding. Only vigilant attention to good operating and maintenance practices can assure a free and operation ready control valve. These practices should include but not be limited to:

1) Critical attention to the control valve environment. This includes steam chemistry and any other potential sources of corrosives as well as system arrangements and practices that promote a well drained control valve, i.e. dry environment for stem and packing assembly, while in standby status.

2) Periodic inspection of the valve stem to detect any surface deterioration that could lead to binding and/or periodic monitoring of the force required to move the valve throughout its stroke range.The stem should be replaced if either surface deterioration or increase in required stroking force are found to be significant.

3) Critical attention to any binding tendencies that may be exhibited by the control valve during regular surveillance testing.

However, if your plant is one that can not assure a dry and corrosion free environment, you can purchase a nuclear grade chrome plated valve stem (specifically 410 stainless steel base material with chrome plating applied over a layer of electroless nickel) to accommodate the additional corrosion resistance required.

If you have questions regarding the above or wish to purchase the chrome plated stem, please contact us. For questions call Ed Grandusky: 716-596-3631, to purchase parts call Mike Lauzze: 716-596-3436.

Best regards,

Carlton Slater

Carlton Slater
Service Engineer

CMS/slz
D9-18-93

Customers that have requested chrome plated valve stems:

Toledo Edison (Davis-Besse Station) - Several stems supplied since 1987 as follow on to agreement made with Terry engineers prior to Joint Venture. Experience with these stems has included no incident of binding with attendant loss of turbine's ability to perform its safety-related function.

American Electric Power Service Corporation (D.C. Cook Station) - One stem supplied (17-4PH base material). Stem was returned after removal from service when spalling of chromed surface was observed. Stem was still free and able to perform its safety-related function. D-R's evaluation of the chrome loss mechanism is documented in Metallurgical Report Number 92-16. The report states that "moisture and other corrosives are at fault in the plating coming off the stem."

Arkansas Power & Light (Nuclear One Station) - Several chromed stems supplied since 1991. Experience with these stems has included some problems with deterioration of chrome surface but no incident of binding with attendant loss of turbine's ability to perform it's safety-related function.

Commonwealth Edison (LaSalle Station) - Stem shipped but not yet installed.

Duke Power (McGuire Station) - Order in process but stem not yet shipped.

NUCLEAR MAIL LIST

MARCH 23, 1993

SITE	A1	A2	A3	SITE COUNT	TURBINE	UTILITY
					✓ T-41930A , B	Korea Electric Company
					✓ T-38848A	Furnas-Centrais Eletricas SA
					✓ T-38467A , B	Hidroelectrica Espanola SA
✓ Asco 1 & 2	C.N. Asco	Asco (Tarragona)		Spain	T-39623A ,B	ASOCIACION NUCLEAR ASCO
✓ Belleville 1 & 2	B.P. 11	18240 Lere		France	T-42514A , T-42741A	Electricite de France
✓ Bugey 2 & 3	B.P. 14 Loyettes	01980 Nexiaieux		France	T-38456A , B	Electricite de France
✓ Bugey 4 & 5	B.P. 14 Loyettes	01980 Nexiaieux		France	T-38880A , B	Electricite de France
✓ Cattenom 1 & 2	B.P. 41	57570 Cattenom		France	T-42319A , T-42374A	Electricite de France
✓ Cattenom Plant	B.P. 41	57570 Cattenom		France	T-42891, T-81305	Electricite de France
✓ Chooz Plant	B.P. 174	08600 Givet		France	T-43040 A,B	Electricite de France
✓ Doel III & IV	Scheldemolenstraat	B-2791 Doel		Belgium	T-40593A , T-41170A	Societes Reunies d'Energie du Bassin de l'Escaut (RAES)
✓ Electricite de France	Moselle Station	2 rue Louis Marat	75008 Paris	France	D0426, D0281	Electricite de France
✓ Fessenheim 1 & 2	B.P. 15	68740 Fessenheim		France	T-38117A ,B	Electricite de France
✓ Flamanville 1 & 2	B.P. 4	50340 Les Pieux		France	T-42266A , T-42423A	Electricite de France
✓ Korea Nuclear, Unit 2, 5 & 6	216, Ko-Ri, Changwan-Up	Yangsan-Gun	Kyongsangnam-Do, 626-600	Korea	T-41171A , T-4148. , B	Korea Electric Power Corporation
✓ Krsko Nuclear Power Plant	68270 KRSKO	Vrbina 12		Yugoslavia	T-40366A	Savske Elektrarne Ljubljana (Slovenia)
✓ Maanshan 1 & 2	187, Manwan Rd.	Hengtsun	Pingtung	Taiwan, China	T-40893A , B	Taiwan Power Co.
✓ Nogent s/Seine 1 &	B.P. 62	10400 Nogent sur Seine		France	T-42623A	Electricite de France

FOREIGN COUNTRIES

NUCLEAR MAIL LIST

MARCH 29, 1991

SITE	A1	A2	A3	SITE COUNT	TURBINE	UTILITY
Z						
✓ Paluel 1,2,3 & 4	B.P. 48	76450 Cany Barville		France	T-42054A , T-42055A , T-42272A , T-42461A	Electricite de France
✓ PNPP	Napot Point	Morong	Bataan	Philippines	T-41172A	Philippine National Power Corp.
✓ Point Lepreau 1	P.O. Box 10	Lepreau, New Brunswick E0G 2H0		Canada	T-90033A	New Brunswick Electric Power Commission
✓ St. Alban 1 & 2	B.P. 31	38550 Le Peage de Roussillon		France	T-42265A , T-42320A	Electricite de France
✓ Tihange 1	SENO Exploitation	avenue de l'Industri	B-5201 Tihange/Huy	Belgium	T-37521A	Societe Belgo-Francaise d'Energia Nucleaire Mosane (SENO)
✓ Vandellos	Carretera Nacional - 340 - km. 1.123	43890 Hospitalet del Infante		Tarragona, Spain	T-41925A	Hispano-Francesa de Energia nuclear, S. (HIFRENSA)

FOREIGN COUNTRIES

NUCLEAR MAIL LIST

MARCH 23, 1993

SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY
✓✓ ANO 1	RTE. 3, BOX 137G	RUSSELLVILLE, ARK	72801	42264A	ENTERGY OPERATIONS, INC.
	RTE. 3, BOX 137G	RUSSELLVILLE, ARK	72801	37665A	
✓ ASCO	C.N. ASCO	TARRAGONA, SPAIN		39623A	ASOCIACION NUCLEAR ASCO
✓ BEAVER VALLEY 1	P.O. BOX	SHIPPINGTON, PA	15122-0004	36555	DUQUESNE LIGHT CO.
✓ BEAVER VALLEY 2	P.O. BOX	SHIPPINGTON, PA	15122-0004	38492A	DUQUESNE LIGHT CO.
✓ BROWNS FERRY	P.O. BOX 2000	DECATUR, AL	35602	35685, 35686, 35687	TENNESSEE VALLEY AUTHORITY
✓ BRUNSWICK 1	P.O. BOX 10429	SOUTHPORT, NC	28461	36683A, 36683B	CAROLINA POWER & LIGHT CO.
✓ CALLAWAY	P.O. BOX 620	FULTON, MO	65251	40176	UNION ELECTRIC CO.
✓ CALVERT CLIFFS	ROUTES 2 & 4	LUSBY, MD	20627	36674A, B, C, D	BALTIMORE GAS & ELECTRIC CO
✓ CATAWBA 1	P.O. BOX 293	CLOVER, SC	29710	40096A, 40096B	DUKE POWER CO.
✓ CLINTON	BOX 678	CLINTON, IL	61727	38187A	ILLINOIS POWER CO.
✓ COMANCHE PEAK	P.O. BOX 2300	GLEN ROSE, TX	76043	39622A, 39622B	TEXAS UTILITIES ELECTRIC CO. GENERATING DIVISION
✓ COOPER	P.O. BOX 98	BROWNVILLE, NE	68321	35939	NEBRASKA PUBLIC POWER DISTRICT
✓ CRYSTAL RIVER 3	P.O. BOX 219	CRYSTAL RIVER, FL	32629	37009A	FLORIDA POWER CORPORATION
✓ DAVIS BESSE	5501 N. STATE ROUTE 2	OAK HARBOR, OH	43449	37686A, 37686B	TOLEDO EDISON CO.

U.S. COMPANIES

NUCLEAR MAIL LIST

MARCH 23, 1993

SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY
✓ DIABLO CANYON	P.O. BOX 56	AVILA BEACH, CA	93424	36565, 36566	PACIFIC GAS AND ELECTRIC CO.
✓ DONALD C. COOK 1	ONE COOK PLACE	BRIDGMAN, MI	49106	36700A, 36700B	INDIANA/MICHIGAN POWER CO., c/o AMERICAN ELECTRIC POWER SERVICE CORP
✓ DUANE ARNOLD	DUANE ARNOLD ENERGY CENTER, 3277 DAEC RD.	PALO, IA	52324	36695A	IOWA ELECTRIC LIGHT & POWER CO.
✓✓ EDWIN I. HATCH 1	P.O. BOX 439	BAXLEY, GA	31513	36681A	GEORGIA POWER CO.
✓ EDWIN I. HATCH 2	P.O. BOX 439	BAXLEY, GA	31513	37121A	GEORGIA POWER CO.
✓ FERMI 2	6400 N. DIXIE HIGHWAY	NEWPORT, MI	48166	36689A	DETROIT EDISON CO.
✓✓ GRAND GULF	P.O. BOX 756	PORT GIBSON, MS	39150	38180A	ENTERGY OPERATIONS, INCL
	P.O. BOX 756	PORT GIBSON, MS	39150	38175A	
✓✓ HADDAM NECK	R.R. #1, BOX 127E	EAST HAMPTON, CT	06424	36024	CONNECTICUT YANKEE ATOMIC POWER CO
	R.R. #1, BOX 127E	EAST HAMPTON, CT	06424	34001	
✓ HOPE CREEK	P.O. BOX L	HANCOCKS BRIDGE, NJ	08038	37123A	PUBLIC SERVICE ELECTRIC & GAS CO.
✓ INDIAN POINT 2	BROADWAY AND BLEAKLEY AVE.	BUCHANAN, NY	10511	30504, 30505	CONSOLIDATED EDISON CO. OF NEW YORK, INC.
✓ JAMES A. FITZPATRICK	P.O. BOX 41	LYCOMING, NY	13093	35940	NEW YORK POWER AUTHORITY
✓ JOSEPH M. FARLEY	P.O. DRAWER 470	ASHFORD, AL	36312	37858A, 37858B	ALABAMA POWER COMPANY

U.S. COMPANIES

NUCLEAR MAIL LIST

MARCH 23, 1993

SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY
✓ KEWAUNEE	ROUTE 1, BOX 48	KEWAUNEE, WIS	54216	37035A	WISCONSIN PUBLIC SERVICE CORP
✓ LASALLE COUNTY 1	R.R. NO. 1, BOS 220	MARSEILLES, IL	61341	37133A, 37133B	COMMONWEALTH EDISON COMPANY
✓ LIMERICK	EVERGREEN & SANATOGA RD., P.O. BOX A	SANATOGA, PA	19464	36691A, 36691B	PHILADELPHIA ELECTRIC CO.
✓ MAIN YANKEE	EDISON DR.	AUGUSTA, ME	04336	36546	MAINE YANKEE ATOMIC POWER CO.
✓ MCGUIRE 2	P.O. BOX 488	CORNELIUS, NC	28013	37948A, 37948B	DUKE POWER CO.
✓✓ MILSTONE	P.O. BOX 128	WATERFORD, CT	06385	38587A	NORTHEAST UTILITIES
	P.O. BOX 128	WATERFORD, CT	06385	37273A	
✓ MONTICELLO	P.O. BOX 600	MONTICELLO, MN	55362	35690	NORTHERN STATES POWER CO.
✓ NINE MILE POINT	LAKE RD., P.O. BOX 32	LYCOMING, NY	13093	38171A	NIAGARA MOHAWK POWER CORP.
✓✓ NORTH ANNA	P.O. BOX 402	MINERAL, VA	23117	37059A, 37059B	VIRGINIA POWER
	P.O. BOX 402	MINERAL, VA	23117	38032A, 38032B	
✓ PALO VERDE 1	P.O. BOX 52034	PHOENIX, AZ	85072	40568A, B, C	ARIZONA PUBLIC SERVICE CO
✓ PEACH BOTTOM	RD #1	DELTA, PA	17314	35691, 35692	PHILADELPHIA ELECTRIC CO.
✓ PERRY	10 CENTER RD	PERRY, OH	44081	38176A	CLEVELAND ELECTRIC ILLUMINATING CO.
✓✓ PILGRIM 1	ROCKY HILL RD	PLYMOUTH, MA	02360	35693	BOSTON EDISON CO.
	ROCKY HILL RD	PLYMOUTH, MA	02360	36216	

U.S. COMPANIES

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SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY
✓POINT BEACH	6610 NUCLEAR RD	TWO RIVERS, WIS	54241	36181, 36182	WISCONSIN ELECTRIC POWER CO.
✓PRAIRIE ISLAND	1717 WAKONADE DR. E. (RT 2)	WELCH, MN	55089	37008A, 37008B	NORTHERN STATES POWER CO.
✓QUAD CITIES	22710 206TH AVE. NO.	CORDOVA, IL	61242	35688, 35689	COMMONWEALTH EDISON COMPANY
✓RANCHO SECO	14440 TWIN CITIES RD.	HERALD, CA	95638	37168A	SACREMENTO MUNICIPAL UTILITY DISTRICT
✓ RIVER BEND	P.O. BOX 220	ST. FRANCISVILLE, LA	70775	38182A	GULF STATES UTILITIES CO.
✓ SALEM	P.O. BOX 236	HANCOCKS BRIDGE, NJ	08038	36988A, 36933B	PUBLIC SERVICE ELECTRIC & GAS CO.
✓ SAN ONOFRE	P.O. BOX 128	SANCLEMENTE, CA	96272	40101A, 40101B	SOUTHERN CALIFORNIA EDISON CO.
✓ SEABROOK STATION	P.O. BOX 300	SEABROOK, NH	03874	41062A, 41063A	NEW HAMPSHIRE YANKEE
✓ SEQUOYAH	P.O. BOX 2000	SODDY-DAISY, TN	37379	37480A, 37480B	TENNESSEE VALLEY AUTHORITY
✓SHEARON HARRIS	P.O. BOX 165	NEW HILL, NC	27562	41056A, 41057A	CAROLINA POWER & LIGHT CO.
✓ SHOREHAM	P.O. BOX 618	WADING RIVER, NY	11792	36693A	LONG ISLAND LIGHTING CO.
✓ SOUTH TEXAS PROJECT 1	P.O. BOX 308	BAY CITY, TX	77414	40749A, 40749B	HOUSTON LIGHTING & POWER COMPANY
✓ ST. LUCIE 1	P.O. BOX 128	FORT PIERCE, FL	33454	37549A	FLORIDA POWER & LIGHT CO.

U.S. COMPANIES

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SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY
✓ ST. LUCIE 2	P.O. BOX 128	FORT PIERCE, FL	33454	40230A	FLORIDA POWER & LIGHT CO.
✓✓ SURRY	P.O. BOX 315	SURRY, VA	23883	36178, 36179	VIRGINIA POWER
	P.O. BOX 315	SURRY, VA	23883	36318, 36319, 36320, 36321	
✓ SUSQUEHANNA	P.O. BOX 467	BERWICK, PA	18603	37126B, 37127B	PENNSYLVANIA POWER & LIGHT CO.
✓ TROJAN	SOUTH COLUMBIA RIVER HIGHWAY	RAINIER, OR	97048	37470A	PORTLAND GENERAL ELECTRIC CO.
✓ TURKEY POINT 3 & 4	P.O. BOX 4332	PRINCETON, FL	33032	41812A, B, C	FLORIDA POWER & LIGHT CO.
✓ VERMONT YANKEE	GOVERNOR HUNT RD, P.O. BOX 157	VERNON, VT	05354	35938	VERMONT YANKEE NUCLEAR POWER CORP.
✓ VIRGIL C. SUMMER	P.O. BOX 98	JENKINSVILLE, SC	29065	38765A	SOUTH CAROLINA ELECTRIC & GAS
✓ VOGTLE 1	P.O. BOX 1600	WAYNESBORO, GA	30830	41173A, 41173B	GEORGIA POWER CO.
✓ WATERFORD 3	P.O. BOX 8, HIGHWAY 18	KILLONA, LA	70066	38280A	ENTERGY OPERATIONS, INCL
✓ WATTS BAR	P.O. BOX 800	SPRING CITY, TN	37381	38677A, 38677B	TENNESSEE VALLEY AUTHORITY
✓✓ WNP	P.O. BOX 968	RICHLAND, WA	9935	40349A, 40349B	WASHINGTON PUBLIC POWER SUPPLY SYSTEM
	P.O. BOX 968	RICHLAND, WA	9[illegible]52	40809A, B, C, D	
	P.O. BOX 968	RICHLAND, WA	9[illegible]52	37476A	
✓ WOLF CREEK	P.O. BOX 411	BURLINGTON, KA[illegible]	6[illegible]339	40177A	WOLF CREEK NUCLEAR

U.S. COMPANIES

NUCLEAR MAIL LIST

MARCH 23, 1993

SITE	SITE ADDRESS	SITE CITY, STATE	ZIP CO	SERIAL	UTILITY OPERATING CORP
ZION 1	101 SHILOH BLVD	ZION, IL	60099	36727A, 36727B	COMMONWEALTH EDISON COMPANY

U. S. COMPANIES