



**ENGINE SYSTEMS, INC.**

175 Freight Road  
Rocky Mount, NC 27804

Telephone: 252/977-2720  
Fax: 252/446-1134

October 25, 2019

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555-0001

Subject: 10CFR21 Reporting of Defects and Non-Compliance -  
Engine Systems, Inc. Report No. 10CFR21-0127, Rev. 0  
  
EMD Fuel Injectors – Seized Plunger and Bushing

Dear Sir / Madam:

The enclosed report addresses a reportable notification on EMD fuel injectors – seized plunger and bushing.

A copy of the report has been mailed to our affected nuclear customers.

Please sign below, acknowledging receipt of this report, and return a copy to the attention of Document Control at the address above (or, fax to number 252/446-1134) within 10 working days after receipt.

Yours very truly,

ENGINE SYSTEMS, INC.

Susan Woolard  
Document Control

*ZE19  
NRR*

Please let us know if ANY of your mailing information changes - name of recipient, name of company/facility, address, etc. Mark the changes on this acknowledgment form and send to us by mail or FAX to the number above.

RECEIVED: \_\_\_\_\_

DATE: \_\_\_\_\_



**ENGINE SYSTEMS, INC.**

175 Freight Road, Rocky Mount, NC 27804

Telephone: 252/977-2720

Fax: 252/448-1134

Report No. **10CFR21-0127**

Rev. 0: **10/24/19**

**10CFR21 REPORTING OF DEFECTS  
AND NON-COMPLIANCE**

COMPONENT: EMD Fuel Injector – seized plunger and bushing

SYSTEM: Emergency Diesel Generator

CONCLUSION: Reportable in Accordance With 10CFR21

Prepared By:

*Ju Lin*

Engineering Manager

Date:

10/24/19

Reviewed By:

*Dan Robert*

Quality Manager

Date:

10/24/19

REV	DATE	PAGE	DESCRIPTION
0	10/24/19		Initial issue.

**Pursuant to 10 CFR 21.21(d)(4), ESI is presenting the required information as follows:**

(i) Name and address of the individual or individuals informing the Commission.

<i>John Kriesel</i>	<i>Dan Roberts</i>
<i>Engineering Manager</i>	<i>Quality Manager</i>
<i>Engine Systems Inc.</i>	<i>Engine Systems Inc.</i>
<i>175 Freight Rd.</i>	<i>175 Freight Rd.</i>
<i>Rocky Mount, NC 27804</i>	<i>Rocky Mount, NC 27804</i>

(ii) Identification of the basic component supplied within the United States which fails to comply or contains a defect.

*EMD fuel injectors (new and refurbished) of the following part numbers:*

<b>Description</b>	<b>Part Number</b>
<i>New Injector</i>	<i>40084714</i>
	<i>40084715</i>
	<i>40084720</i>
	<i>40084724</i>
	<i>40084725</i>
	<i>40099335</i>
<i>Refurbished Injector (Repair &amp; Return)</i>	<i>5228895-RR</i>
	<i>5229250-RR</i>
	<i>5229315-RR</i>
	<i>5229325-RR</i>
	<i>40084714-RR</i>
	<i>40084720-RR</i>
	<i>40084723-RR</i>
	<i>40084724-RR</i>
<i>40099335-RR</i>	

(iii) Identification of the firm supplying the basic component which fails to comply or contains a defect.

*Engine Systems Inc. (ESI)*

(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

*ESI was notified by a nuclear customer that 3 of 20 recently installed fuel injectors seized after a short amount of engine run time. Examination of the plunger and bushing (P&B) from each injector identified particles consistent with the base material of the P&B embedded in the scar marks associated with the seizures. The root cause of the seizures is attributed to residual machining debris from the manufacturing process. This batch of injectors had been refurbished in 2013 and the P&Bs were replaced as part of the rework activity.*

*These part number mechanical unit fuel injectors are used on various model EMD 645 diesel engines. The engine utilizes one injector per cylinder, therefore failure of one injector will render the associated cylinder inoperable. An EMD 645 engine will typically tolerate one inoperable cylinder and maintain rated load; however multiple inoperable cylinders (as in the case of multiple injector failures) will further decrease engine output and likely prevent the engine from carrying its required load. This adversely affects the ability of the emergency diesel generator set to perform its safety-related function.*

(v) The date on which the information of such defect or failure to comply was obtained.

*September 6, 2019*

- (vi) In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

*Based on the findings of this investigation, ESI cannot conclusively limit the number of affected injectors by batch or date code and considers all part numbers listed in section (ii) to be suspect. A list of customers by injector part number is contained in Appendix A.*

*Note: This issue applies only to injectors in inventory that have not been installed.*

*For injectors that have been installed in an engine and have accumulated more than 2 hours of run time, then the injector is not susceptible to seizure from this type of issue. It has been shown that P&B seizures related to foreign material occur within the first 2 hours of engine operation.*

- (vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

For end users:

- *Fuel injectors installed on engine:  
No action is required. Successful completion of on-engine testing indicates the injector is not susceptible to failure due to foreign material.*
- *Fuel injectors in inventory (not-installed) on engine:  
Fuel injectors in inventory are considered suspect and should be returned to ESI for evaluation, inspection, and additional testing.*

For ESI:

- *Corrective actions implemented as a result of 10CFR21-0115 (Jan 2017) remain in place and will continue to be utilized. ESI implemented a mandatory 2-hour extended run time test within the fuel injector functional test requirements. Because this test has only been applied since 2017, injectors supplied prior to 2017 did not benefit from this screening process.*

*In addition to the extended run time test, ESI will implement the following new corrective actions:*

- *Verification of the plunger and bushing cleaning process at the current manufacturer's facility prior to injector assembly. Note the fuel injector manufacturer changed in 2017 (part numbers now contain an "H" prefix). Injectors subject to this Part 21 were supplied by the previous manufacturer.*
- *Inspection, under magnification, of the plunger and bushing to ensure no visible debris or remnants of the machining process.*

*These actions are currently underway and are expected to be completed within 30 days, but in all cases prior to future shipments.*

- (viii) Any advice related to the potential defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

*Failures of fuel injection equipment on safety-related diesel engines have been the subject of previous Part 21 reports, among various engine brands, and typically involve seizing of the plunger and bushing (also referred to as plunger and barrel on other engines). These components have a design clearance measured to the millionth of an inch ( $\mu\text{in}$ ) and due to the tight clearance, cleanliness of all components is extremely important.*

*The purpose of this 10CFR21 report is to notify users that ESI has identified instances among several batches of injectors where undesired debris was detected that could potentially result in seizure of the P&B (as in the case of the Surry injectors). This is not to say that all injectors are susceptible to failure (it is believed the vast majority of the injectors contained in this notification are either functioning on an engine or have been replaced following a successful service life), but that ESI cannot conclusively limit the number of affected injectors. For this reason, it is recommended that injectors in storage be returned to ESI for further evaluation.*

Part Number	Description	ESI Order	Customer	Customer PO	Qty Shipped	C of C Date
40084714	Fuel Injector 16-645F4B, F7B (900 RPM)	98456	WESTINGHOUSE SAVANNAH RIVER CO	AC23503M	32	31-May-02
		3000786	PROGRESS ENERGY FLORIDA INC- CRYSTAL RIVER	00196797	7	25-Oct-04
		9006669	PROGRESS ENERGY FLORIDA INC- CRYSTAL RIVER	00473749	10	07-Jan-10
		3015928	SAVANNAH RIVER REMEDIATION LLC	SRRA069144	32	06-Dec-16
40084715	Fuel Injector 20-645F4B (900 RPM)	3001260	FLORIDA POWER & LIGHT - TURKEY POINT	00081834	6	02-May-05
		3004397	FLORIDA POWER & LIGHT - TURKEY POINT	00111101	5	08-May-08
		3008230	FLORIDA POWER & LIGHT - TURKEY POINT	02288448	50	26-Apr-11
		3011423	FLORIDA POWER & LIGHT - TURKEY POINT	02313521/00007	1	27-May-14
		3014397	FLORIDA POWER & LIGHT - TURKEY POINT	02338838	2	13-Jul-15
		95252	EXELON GENERATION COMPANY	703, REL 10719	20	19-Apr-02
40084720	Fuel Injector 8,12,16,20-645E4 (900 RPM)	100394	FIRST ENERGY CORP - BEAVER VALLEY	7095278	22	31-Jul-02
		101802	TENNESSEE VALLEY AUTHORITY - WATTS BAR	00001690/00117	18	08-Oct-02
		104475	EXELON - CLINTON POWER PLANT	00051404	9	22-Jan-03
		105598	EXELON GENERATION COMPANY	703, REL 10849	20	19-Feb-03
		106624	EXELON GENERATION COMPANY	00000703 / 10858	20	29-Apr-03
		107189	EXELON GENERATION COMPANY	703, REL 10891	6	03-Mar-03
		115365	FLORIDA POWER AND LIGHT	00070134, REV 003	2	11-Feb-04
		115802	TENNESSEE VALLEY AUTHORITY	00001690/00290	12	12-Feb-04
		3000317	TENNESSEE VALLEY AUTHORITY-WATTS BAR	00001690/00313	4	19-Apr-04
		3000343	FLORIDA POWER & LIGHT -TURKEY POINT	00072444	10	30-Jun-04
		3000366	TENNESSEE VALLEY AUTHORITY-SEQUOYAH	00001690/00316	4	27-May-04
		3000462	FLORIDA POWER & LIGHT-ST LUCIE PLANT	00073328	4	27-May-04
		3000764	TENNESSEE VALLEY AUTHORITY-SEQUOYAH	00001690/00346	16	20-Oct-04
		3000792	EXELON - CLINTON POWER PLANT	00077164	29	20-Oct-04
		3000992	TENNESSEE VALLEY AUTHORITY-SEQUOYAH	00001690/00364	124	13-Jan-05
		3001077	TAIWAN POWER COMPANY	008931120148	16	29-Mar-05
		3001158	OMAHA PUBLIC POWER DISTRICT	00079656	2	19-May-05
		3001264	SOUTHERN CALIFORNIA EDISON CO	6H220906 A114	27	11-May-05
		3001490	TENNESSEE VALLEY AUTHORITY - SEQUOYAH	00001690/00425	14	24-Aug-05
		3001537	GE ENERGY SERVICES SOURCING	431004600	2	07-Oct-05
		3001711	FIRST ENERGY CORP - DAVIS BESSE	45170000	25	04-Nov-05
		3002308	OMAHA PUBLIC POWER DISTRICT	00093891	6	10-May-06
		3002459	FIRST ENERGY CORP - DAVIS BESSE	45199725	40	14-Aug-06
		3002598	DUKE ENERGY-OCONEE NUCLEAR	00079123	4	22-Nov-06
		3002812	NUCLEAR MANAGEMENT - POINT BEACH	00011858	6	22-Nov-06
		3003011	DOMINION ENERGY KEWAUNEE INC	45493222	10	13-Mar-07
		3003163	EXELON - DRESDEN	703, Rel 11505	3	18-May-07
		3003592	DOMINION VIRGINIA POWER - SURRY POWER STATION	45532540	20	17-Aug-07
		3004633	EXELON - CLINTON POWER PLANT	703, Rel 11682	28	13-Aug-08
		3004759	GE COMPANY	437014200	2	24-Sep-08
		3004839	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/00672	6	19-Aug-08
		3004953	FIRST ENERGY CORP - BEAVER VALLEY	45280077	7	02-Jan-09
		3005309	TENNESSEE VALLEY AUTHORITY - SEQUOYAH	00001690/00719	24	28-Jan-09
		3005631	DREMEL INC / CFE LAGUNA VERDE	09-023	28	21-Aug-09
		3005740	TENNESSEE VALLEY AUTHORITY - WATTS BAR	00001690/00763	20	10-Apr-09
		3005983	FIRST ENERGY CORP - BEAVER VALLEY	45305855	1	25-Jun-09
		3006088	ENERGY NORTHWEST	00329398	39	26-Aug-09
		3006177	ENERGY NORTHWEST	00329499	20	24-Aug-09
		3006587	ENERGY NORTHWEST	00330098	1	20-Nov-09
		3007223	EXELON AMERGEN - OYSTER CREEK NUCLEAR	80 035799	21	30-Apr-10
		3007412	EXELON - CLINTON POWER PLANT	703, Rel 12036	19	16-Aug-10
		3007606	DOMINION ENERGY KEWAUNEE INC	45782155	20	27-Jan-11
		3007661	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/159405	20	13-Sep-10
		3007911	FLORIDA POWER & LIGHT-ST LUCIE PLANT	02264687	30	23-Nov-10
		3007936	ENTERGY OPERATIONS INC - ARKANSAS	10301484	5	27-Jan-11
		3008018	ENTERGY OPERATIONS INC - ARKANSAS	10302045	6	27-Jan-11
		3008079	FLORIDA POWER & LIGHT - TURKEY POINT	02286336	20	31-Jan-11
		3008168	SOUTHERN CALIFORNIA EDISON COMPANY	4500374038	36	23-Mar-11
		3008230	FLORIDA POWER & LIGHT - TURKEY POINT	02288448	30	28-Apr-11
		3008238	EXELON - DRESDEN	703, Rel 12143	20	23-Mar-11
3008782	ENERGY NORTHWEST	00334378	20	22-Jul-11		
3008874	EXELON AMERGEN - OYSTER CREEK NUCLEAR	80 042815	20	06-Sep-11		

Part Number	Description	ESI Order	Customer	Customer PO	Qty Shipped	C of C Date
		3009007	FIRST ENERGY CORP - BEAVER VALLEY	45379025	3	09-Feb-12
		3009059	FLORIDA POWER & LIGHT-ST LUCIE PLANT	02297747	30	29-Nov-11
		3009292	ENERGY NORTHWEST	00935018	3	02-Feb-12
		3009306	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	344517	6	16-Feb-12
		3009308	FIRST ENERGY CORP - DAVIS BESSE	45381868	20	02-Feb-12
		3009382	ENERGY NORTHWEST	00335100	19	02-Feb-12
		3009576	FLORIDA POWER & LIGHT - ST LUCIE	02303198	28	10-Apr-12
		3009588	ENERGY NORTHWEST	00935326	38	13-Feb-12
		3009888	NEXTERA ENERGY POINT BEACH LLC	02307153	13	10-May-12
		3010118	EXELON - DRESDEN	703, Rel 12330	2	19-Jun-12
		3010164	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	424011	21	18-Jul-12
		3010214	FIRST ENERGY CORP - DAVIS BEESE	45401210	25	02-Oct-12
		3010392	TENNESSEE VALLEY AUTHORITY - BROWN'S FERRY	453328	112	12-Nov-12
		3010456	DOMINION VIRGINIA POWER - SURRY POWER STATION	4500015328	42	12-Oct-12
		3010641	ENTERGY OPERATIONS INC - ARKANSAS	10365519	4	10-Dec-12
		3010655	NEXTERA ENERGY POINT BEACH LLC	02314687	4	07-Dec-12
		3010950	NEXTERA ENERGY POINT BEACH LLC	02313520/00001	3	28-Jun-13
		3010959	NORTHERN STATES POWER COMPANY - MONTICELLO	00045592	20	12-Apr-13
		3010981	FIRST ENERGY CORP - BEAVER VALLEY	45415892	6	12-Mar-13
		3011150	TENNESSEE VALLEY AUTHORITY - BROWN'S FERRY	527037	14	25-Jun-13
		3011440	EXELON - DRESDEN	00507145	20	28-Jun-13
		3011596	EXELON AMERGEN - OYSTER CREEK NUCLEAR	80 053291	2	07-Oct-13
		3011648	ENERGY NORTHWEST	00339091	4	11-Oct-13
		3011879	TAIWAN POWER COMPANY	4200000187/008022006401	32	28-Oct-13
		3011961	ENERGY NORTHWEST	00339360	20	30-Oct-13
		3012288	BMPC - KAPL	7017027	16	13-Jan-14
		3012316	ENTERGY OPERATIONS INC - ARKANSAS	10401961	6	18-Mar-14
		3012510	ENERGY NORTHWEST	00340244	4	28-Feb-14
		3012576	FLORIDA POWER & LIGHT - TURKEY POINT	02318321, Rel 00058	18	26-Mar-14
		3012759	BMPC - KAPL	7017247	16	30-Apr-14
		3012838	TENNESSEE VALLEY AUTHORITY - WATTS BAR	689489	50	15-Jul-14
		3012886	OMAHA PUBLIC POWER DISTRICT	00204301	4	14-Jul-14
		3012903	FIRST ENERGY CORP - BEAVER VALLEY	45453509	39	19-Sep-14
		3012990	DUKE ENERGY CAROLINAS LLC - OCONEE NUCLEAR	00186653	12	14-Jun-14
		3013125	FIRST ENERGY CORP - BEAVER VALLEY	45454656	20	19-Sep-14
		3013260	TENNESSEE VALLEY AUTHORITY - SEQUOYAH	728428	2	14-Jan-15
		3013350	FIRST ENERGY CORP - DAVIS BESSE	45463296	45	23-Jan-15
		3013901	TENNESSEE VALLEY AUTHORITY - WATTS BAR	798548	8	27-Mar-15
		3014048	ENERGY NORTHWEST	00343535	4	29-Apr-15
		3014065	DREMEL INC / CFE LAGUNA VERDE	15-011/700453336	144	10-Jul-15
		3014189	ENERGY NORTHWEST	00343840	40	30-Apr-15
		3014734	EXELON AMERGEN - OYSTER CREEK NUCLEAR	80 066370	2	11-Jan-16
		3014829	ENERGY NORTHWEST	00345349	4	30-Nov-15
		3014961	EXELON - DRESDEN	703, Rel 12681	28	25-Jan-16
		3015200	ENTERGY OPERATIONS INC - ARKANSAS	10470233	34	16-May-16
		3015459	OMAHA PUBLIC POWER DISTRICT	00225211	2	28-Mar-16
		3015475	OMAHA PUBLIC POWER DISTRICT	00225249	1	29-Mar-16
		3016241	NEXTERA ENERGY POINT BEACH LLC	02358779	1	17-May-17
		3016592	NEXTERA ENERGY POINT BEACH LLC	02362600	1	27-Nov-17
		3017027	EXELON - NINE MILE POINT	00622245	30	12-Sep-17
		3017182	EXELON - DRESDEN	00000703 Rel 12859	10	07-Aug-17
		3017394	EXELON AMERGEN - OYSTER CREEK NUCLEAR	00625557	3	25-Sep-17
		3018343	BMPC - KAPL	112732-25-2	2	03-May-18
		8002077	TENNESSEE VALLEY AUTHORITY - BROWN'S FERRY	508382	1	25-Jun-13
		8002111	TENNESSEE VALLEY AUTHORITY - BROWN'S FERRY	508382	5	25-Jun-13
		8002126	FIRST ENERGY CORP - DAVIS BESSE	45401210	1	11-Oct-13
		8002159	FIRST ENERGY CORP - DAVIS BESSE	45401210	21	27-Sep-13
		8002160	FIRST ENERGY CORP - BEAVER VALLEY	45415892	6	07-Oct-13
		8002165	ENTERGY OPERATIONS INC - ARKANSAS	10883872	4	25-Jul-13
		8002168	TENNESSEE VALLEY AUTHORITY - BROWN'S FERRY	555349	56	25-Jun-13
		8002191	FLORIDA POWER & LIGHT - ST LUCIE	02320675	2	31-Oct-13
		8002677	DREMEL INC / CFE LAGUNA VERDE	16-010	9	23-Jan-17

40064720

Fuel Injector  
8,12,16,20-645E4 (900 RPM)

Part Number	Description	ESI Order	Customer	Customer PO	Qty Shipped	C of C Date
40084724	Fuel Injector 12,16,20-645E4/E4B (750 RPM)	3004246	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2008/001	10	18-Mar-08
		3004273	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2008/029	40	01-Jul-08
		3004765	PGS ENRIQUE MARIA HIERRO SL - COFRENTES	N2008/069	46	02-Oct-08
		3005345	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2009/024	40	06-May-09
		3006472	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2009/127	40	28-Jan-10
		3008203	NUCLEAR POWER PLANT KRSKO+	NEK-11033/309	8	14-Jun-11
40084725	Fuel Injector 12,16-645 E4B	107339	KOREA HYDRO & NUCLEAR POWER CO	K02M1061H1	8	27-Jun-03
		3005531	KOREA HYDRO & NUCLEAR POWER CO	K080723241	10	22-May-09
40099335	Fuel Injector 12,16,20-645F4B (750 RPM)	3009667	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2012/032	40	21-Aug-12
		8000114	CENTRAL NUCLEAR DE ALMARAZ	EM04IN04170MA REV 0	2	14-Sep-06
		8001775	NUCLEAR POWER PLANT KRSKO+	NEK-10766/436	32	22-Feb-12
5229250-RR	Fuel Injector Repair and Return	92266	POOLED EQUIPMENT INVENTORY COMPANY	PG00-1	20	26-Feb-02
		93870	POOLED EQUIPMENT INVENTORY COMPANY	PG00-1	20	26-Feb-02
		98325	ENTERGY NUCLEAR OPERATIONS	4500511844	20	11-Jun-02
		101638	EXELON GENERATION COMPANY	47230	1	09-Oct-02
		102856	TENNESSEE VALLEY AUTHORITY	00001690/00115	20	06-Oct-02
		104986	EXELON GENERATION COMPANY	00047230	1	21-Feb-03
		107217	EXELON GENERATION COMPANY	703, REL 10892/001	1	30-Apr-03
		107218	EXELON GENERATION COMPANY	703, REL 10893	20	29-Apr-03
		107562	ENTERGY NUCLEAR OPERATIONS	4500521401	1	05-Jun-03
		115115	ENERGY NORTHWEST	00316012	61	22-Mar-04
		8000092	NUCLEAR MANAGEMENT - MONTICELLO	P500308	20	22-Mar-04
		8000119	FIRST ENERGY/PERRY NUCLEAR POW	55100803	20	19-Mar-04
		8000162	FIRST ENERGY CORP - PERRY NUCLEAR POWER	55100803	1	27-May-04
		8000171	EXELON - LASALLE	703, REL 11118	21	16-Jul-04
		8000177	FIRST ENERGY CORP - PERRY NUCLEAR POWER	55101795	20	20-Jul-04
		8000361	ENTERGY NUCLEAR-JAMES FITZPATRICK	4500540253	1	15-Nov-05
		8000385	SOUTHERN CALIFORNIA EDISON CO	6F235901	40	23-May-05
		8000422	SOUTHERN CALIFORNIA EDISON CO	6F235901 Rev 01 Rel A002	36	29-Jun-05
		8000438	SOUTHERN CALIFORNIA EDISON CO	6F235901 Rel A003	36	12-Aug-05
		8000474	SOUTHERN CALIFORNIA EDISON CO	6F235901 Rel A004	36	30-Sep-05
		8000489	DUKE ENERGY-OCONEE NUCLEAR	ON 66500	2	13-Dec-05
		8000655	NUCLEAR MANAGEMENT - MONTICELLO	00005865	22	03-Aug-06
		8000661	ENERGY NORTHWEST	00921218/REV 001	3	08-Aug-06
		8000710	EXELON - QUAD CITIES	703, Rel 11399	20	03-Aug-06
		8000728	OMAHA PUBLIC POWER DISTRICT	00095792/Rev #001	5	25-Aug-06
		8000733	EXELON - LASALLE	703, Rel 11408	19	03-Aug-06
		8000848	EXELON - QUAD CITIES	703, Rel 11451	20	01-Feb-07
		8000965	DOMINION VIRGINIA POWER - SURRY POWER STATION	70168743	11	01-Jun-07
		8000970	EXELON - QUAD CITIES	703, Rel 11534	1	14-Aug-07
		8001229	EXELON AMERGEN - OYSTER CREEK NUCLEAR	80 026255	4	02-Dec-08
		8001641	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/121128	10	25-Jan-11
		8001742	EXELON - QUAD CITIES	703, Rel 12113	8	20-Jan-12
		8001754	ENTERGY NUCLEAR FITZPATRICK LLC	10304700	20	16-Feb-12
		8002131	NORTHERN STATES POWER COMPANY - MONTICELLO	00046290	22	14-May-13
		8002162	DOMINION VIRGINIA POWER - SURRY POWER STATION	70265507	40	31-Oct-13
		8002175	ENTERGY OPERATIONS INC RIVER BEND	10387954	2	25-Sep-13
		8002325	DUKE ENERGY CAROLINAS LLC - OCONEE NUCLEAR	00188232	28	31-Mar-15
		8002333	OMAHA PUBLIC POWER DISTRICT	00205507	6	17-Jul-15
		8002356	EXELON - LASALLE	00530360	1	04-Nov-14
		8002519	EXELON - LASALLE	00555614	2	10-Sep-15
		8002572	EXELON - LASALLE	00567642	20	26-Feb-16
		8002695	NORTHERN STATES POWER COMPANY - MONTICELLO	CNT 64134	42	03-Mar-17
		8002747	OMAHA PUBLIC POWER DISTRICT	00227568	14	05-Jul-17



Part Number	Description	ESI Order	Customer	Customer PO	Qty Shipped	C of C Date
5229315-RR	Fuel Injector Repair and Return	111544	NUCLEONOR, S A	5103782	4	22-Mar-04
		8001013	PGS ENRIQUE MARIA HIERRO SL - NUCLENOR	2007/065/QS/18277/07/01/01	7	01-Feb-08
		8001848	PGS ENRIQUE MARIA HIERRO SL - NUCLENOR	N2011/083	5	15-May-12
		8002476	PGS ENRIQUE MARIA HIERRO SL - NUCLENOR	N2015/072	20	06-Jan-16
		8002645	PGS ENRIQUE MARIA HIERRO SL - NUCLENOR	N2016/024	5	05-Aug-16
		93912	ERGYTECH INC	62432-0	40	04-Apr-02
		107759	ERGYTECH INC	3700001129	20	17-Jun-03
		114256	ERGYTECH INC	3700005746	20	23-Mar-04
		8000418	PGS ENRIQUE MARIA HIERRO SL	N2005/042	20	12-Aug-05
		8000811	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2006/067	20	15-Jan-07
8001056	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2007/080 Rev 1	39	15-Feb-08		
8001652	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2010/041	40	02-Feb-11		
40084714-RR	Fuel Injector Repair and Return	8000308	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210347 Rev 002	1	10-Mar-05
		8000309	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210345 Rev 002	1	10-Mar-05
		8000310	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210342 Rev 002	1	10-Mar-05
		8000311	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210340 Rev 002	1	10-Mar-05
		8000312	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210339 Rev 002	1	10-Mar-05
		8000313	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210338 Rev 003	1	05-Oct-05
		8000314	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210330 Rev 004	1	10-Mar-05
8000315	PROGRESS ENERGY FLORIDA INC - CRYSTAL RIVER	00210349 Rev 002	1	10-Mar-05		
40084720-RR	Fuel Injector Repair and Return	8000499	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/00449	3	06-Apr-06
		8000883	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/00520/Rev 002	3	13-Mar-07
		8001203	DOMINION VIRGINIA POWER - SURRY POWER STATION	70182355	20	18-Aug-08
		8001313	DOMINION ENERGY KEWAUNEE INC	70189102	10	27-Jan-09
		8001402	TENNESSEE VALLEY AUTHORITY - BROWNS FERRY	00001690/00777	15	03-Jun-09
		8001568	DOMINION ENERGY KEWAUNEE INC	70208606	10	24-Jun-10
		8002016	OMAHA PUBLIC POWER DISTRICT	00176216	3	11-Jun-13
		8002067	FLORIDA POWER & LIGHT - TURKEY POINT	02310378, Rev 003	2	30-Nov-12
8002857	NEXTERA ENERGY POINT BEACH LLC	02367024	20	07-May-18		
8003057	FLORIDA POWER & LIGHT - ST LUCIE	02381644	4	20-Jun-18		
40084724-RR	Fuel Injector Repair and Return	8002618	PGS ENRIQUE MARIA HIERRO SL - ALMARAZ	N2016/012	67	26-Jul-16