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**Return of Private Foundation
or Section 4947(a)(1) Nonexempt Charitable Trust
Treated as a Private Foundation**

Department of the Treasury
Internal Revenue Service

Note. The foundation may be able to use a copy of this return to satisfy state reporting requirements.

Open to Public Inspection

For calendar year 2012, or tax year beginning _____, **2012, and ending** _____, **20**

Name of foundation FUSION POWER ASSOCIATES		A Employer identification number 52-1162794
Number and street (or P.O. box number if mail is not delivered to street address) 2 PROFESSIONAL DRIVE		B Telephone number (see instructions) (301) 258-0545
City or town, state, and ZIP code Gaithersburg MD 20879		C If exempt application is pending, check here <input type="checkbox"/>
G Check all that apply:		D 1. Foreign organizations, check here <input type="checkbox"/>
<input type="checkbox"/> Initial return	<input type="checkbox"/> Initial return of a former public charity	2. Foreign organizations meeting the 85% test, check here and attach computation <input type="checkbox"/>
<input type="checkbox"/> Final return	<input type="checkbox"/> Amended return	E If private foundation status was terminated under section 507(b)(1)(A), check here <input type="checkbox"/>
<input type="checkbox"/> Address change	<input type="checkbox"/> Name change	F If the foundation is in a 60-month termination under section 507(b)(1)(B), check here <input type="checkbox"/>
H Check type of organization: <input checked="" type="checkbox"/> Section 501(c)(3) exempt private foundation		
<input type="checkbox"/> Section 4947(a)(1) nonexempt charitable trust <input type="checkbox"/> Other taxable private foundation		
I Fair market value of all assets at end of year (from Part II, col. (c), line 16) \$ 415,954		J Accounting method: <input type="checkbox"/> Cash <input checked="" type="checkbox"/> Accrual <input type="checkbox"/> Other (specify) _____
		(Part I, column (d) must be on cash basis.)

	(a) Revenue and expenses per books	(b) Net investment income	(c) Adjusted net income	(d) Disbursements for charitable purposes (cash basis only)
Part I Analysis of Revenue and Expenses (The total of amounts in columns (b), (c), & (d) may not necessarily equal the amounts in column (a) (see instructions).)				
REVENUE				
1 Contributions, gifts, grants, etc., received (attach schedule) <input type="checkbox"/> if the foundation is not required to attach Sch. B	13,283			
2 Interest on savings and temp. cash investments	53	53	53	
3 Dividends and interest from securities	2,212	2,211	2,211	
4 Gross rents				
5a Net rental income or (loss)				
6a Net gain/(loss) from sale of assets not on line 10	1,115			
b Gross sales price for all assets on line 6a	1,115			
7 Capital gain net income (from Part IV, line 2)		1,115		
8 Net short-term capital gain			0	
9 Income modifications			0	
10a Gross sales less rtns. & allowances	0			
b Less: Cost of goods sold				
c Gross profit or (loss) (attach schedule)				
11 Other income (attach schedule) #1	89,737			
12 Total. Add lines 1 through 11	106,400	3,379	2,264	
OPERATING & ADMINISTRATIVE EXPENSES				
13 Compensation of officers, directors, trustees, etc.	46,700	2,311	2,311	44,389
14 Other employee salaries and wages				
15 Pension plans, employee benefits	689	20	20	669
16a Legal fees (attach schedule) #2	145	145	145	
b Accounting fees (attach schedule) #3	950	90	90	860
c Other professional fees (attach schedule) #4				
17 Interest				
18 Taxes (attach schedule) (see instructions) #5	4,714	282	282	4,432
19 Depreciation (attach sch.) and depletion	2,580			
20 Occupancy	6,520	456	456	6,064
21 Travel, conferences, and meetings	37,868			37,868
22 Printing and publications	2,156			2,156
23 Other expenses (attach schedule) #7	11,043	100	100	10,443
24 Total operating and administrative expenses. Add lines 13 through 23	113,365	3,404	3,404	106,881
25 Contributions, gifts, grants paid				
26 Total exp. & disbursements. Add lines 24 and 25	113,365	3,404	3,404	106,881
27 Subtract line 26 from line 12:				
a Excess of revenue over expenses and disbursements	-6,965			
b Net investment income (if neg., enter -0-)				
c Adjusted net income (if neg., enter -0-)				

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Part II Balance Sheets		Attached schedules and amounts in the description column should be for end-of-year amounts only (See inst.)			
		Beginning of year (a) Book Value	End of year (b) Book Value (c) Fair Market Value		
ASSETS	1	Cash -- non-interest-bearing	43,257	42,416	42,416
	2	Savings and temporary cash investments	93,959	92,338	92,338
	3	Accounts receivable 10,200			
		Less: allowance for doubtful accts.	8,400	10,200	10,200
	4	Pledges receivable			
		Less: allowance for doubtful accts.			
	5	Grants receivable			
	6	Receivables due from officers, directors, trustees, and other disqualified persons (attach schedule) (see instructions)			
	7	Other notes and loans receivable (attach schedule)			
		Less: allowance for doubtful accounts			
	8	Inventories for sale or use			
	9	Prepaid expenses and deferred charges			
	10a	Investments -- U S and state govt. obligations (attach schedule)			
	b	Investments -- corporate stock (attach schedule)			
	c	Investments -- corporate bonds (attach schedule)			
	11	Investments -- land, buildings, and equipment basis			
	Less: accumulated depreciation (attach schedule)				
12	Investments -- mortgage loans				
13	Investments -- other (attach schedule)				
14	Land, buildings, and equipment basis 169,374	#8			
	Less: accumulated depreciation (attach schedule)	65,833	63,255	271,000	
15	Other assets (describe)				
16	Total assets (to be completed by all filers -- see the instructions. Also, see page 1, item I)	211,449	208,209	415,954	
LIABILITIES	17	Accounts payable and accrued expenses	1,947	1,243	
	18	Grants payable			
	19	Deferred revenue	74,573	78,259	
	20	Loans from officers, directors, trustees, and other disqualified persons			
	21	Mortgages and other notes payable (attach schedule)			
	22	Other liabilities (describe)			
	23	Total liabilities (add lines 17 through 22)	76,520	79,502	
NET ASSETS OR FUND BALANCES	Foundations that follow SFAS 117, check here <input type="checkbox"/> and complete lines 24 through 26 and lines 30 and 31.				
	24	Unrestricted	135,672	128,707	
	25	Temporarily restricted			
	26	Permanently restricted			
	Foundations that do not follow SFAS 117, ck. here <input checked="" type="checkbox"/> and complete lines 27 through 31.				
	27	Capital stock, trust principal, or current funds			
	28	Paid-in or capital surplus, or land, bldg., and equipment fund			
	29	Retained earnings, accumulated income, endowment, or other funds	135,672	128,707	
30	Total net assets or fund balances (see instructions)	135,672	128,707		
31	Total liabilities and net assets/fund balances (see instructions)	212,192	208,209		

Part III Analysis of Changes in Net Assets or Fund Balances		
1	Total net assets or fund balances at beginning of year -- Part II, column (a), line 30 (must agree with end-of-year figure reported on prior year's return)	135,672
2	Enter amount from Part I, line 27a	-6,965
3	Other increases not included in line 2 (itemize) See attachment #9	
4	Add lines 1, 2, and 3	128,707
5	Decreases not included in line 2 (itemize)	
6	Total net assets or fund balances at end of year (line 4 minus line 5) -- Part II, column (b), line 30	128,707

Part IV Capital Gains and Losses for Tax on Investment Income

Table with 4 columns: (a) List and describe the kind(s) of property sold, (b) How acquired, (c) Date acquired, (d) Date sold. Row 1a: See attachment #10.

Table with 4 columns: (e) Gross sales price, (f) Depreciation allowed, (g) Cost or other basis plus expense of sale, (h) Gain or (loss) (e) plus (f) minus (g). Rows a-e are blank.

Table with 4 columns: (i) F.M.V. as of 12/31/69, (j) Adjusted basis as of 12/31/69, (k) Excess of col (i) over col. (j), (l) Gains (Col. (h) gain minus col. (k), but not less than -0-) or Losses (from col. (h)). Rows a-e are blank.

Summary rows: 2 Capital gain net income or (net capital loss) 1,115; 3 Net short-term capital gain or (loss) as defined in sections 1222(5) and (6) 0.

Part V Qualification Under Section 4940(e) for Reduced Tax on Net Investment Income

(For optional use by domestic private foundations subject to the section 4940(a) tax on net investment income.)

If section 4940(d)(2) applies, leave this part blank.

Was the foundation liable for the section 4942 tax on the distributable amount of any year in the base period? Yes No

Table with 4 columns: (a) Base period years, (b) Adjusted qualifying distributions, (c) Net value of noncharitable-use assets, (d) Distribution ratio. Rows 2011-2007 are blank.

Summary rows: 2 Total of line 1, column (d) 0.000000; 3 Average distribution ratio; 4 Enter the net value of noncharitable-use assets for 2012 from Part X, line 5 373,954; 5 Multiply line 4 by line 3; 6 Enter 1% of net investment income; 7 Add lines 5 and 6; 8 Enter qualifying distributions from Part XII, line 4 232,476.

If line 8 is equal to or greater than line 7, check the box in Part VI, line 1b, and complete that part using a 1% tax rate. See the Part VI instructions.

Part VI Excise Tax Based on Investment Income (Section 4940(a), 4940(b), 4940(e), or 4948 -- see instructions)

1 a Exempt operating foundations described in section 4940(d)(2), check here <input type="checkbox"/> and enter "N/A" on line 1. Date of ruling or determination letter _____ (attach copy of letter if necessary -- see inst.)			
b Domestic foundations that meet the section 4940(e) requirements in Part V, check here <input checked="" type="checkbox"/> and enter 1% of Part I, line 27b	1		
c All other domestic foundations enter 2% of line 27b. Exempt foreign organizations enter 4% of Part I, line 12, col. (b).			
2 Tax under section 511 (domestic section 4947(a)(1) trusts and taxable foundations only. Others enter -0-)	2		0
3 Add lines 1 and 2	3		
4 Subtitle A (income) tax (domestic section 4947(a)(1) trusts and taxable foundations only. Others enter -0-)	4		0
5 Tax based on investment income. Subtract line 4 from line 3. If zero or less, enter -0-	5		0
6 Credits/Payments:			
a 2012 estimated tax payments and 2011 overpayment credited to 2012	6a		
b Exempt foreign organizations -- tax withheld at source	6b		
c Tax paid with application for extension of time to file (Form 8868)	6c		
d Backup withholding erroneously withheld	6d		
7 Total credits and payments. Add lines 6a through 6d	7		0
8 Enter any penalty for underpayment of estimated tax. Check here <input type="checkbox"/> if Form 2220 is attached	8		
9 Tax due. If the total of lines 5 and 8 is more than line 7, enter amount owed.	9		
10 Overpayment. If line 7 is more than the total of lines 5 and 8, enter the amount overpaid.	10		
11 Enter the amount of line 10 to be. Credited to 2013 estimated tax Refunded	11		

Part VII-A Statements Regarding Activities

		Yes	No
1 a During the tax year, did the foundation attempt to influence any national, state, or local legislation or did it participate or intervene in any political campaign?	1a		X
b Did it spend more than \$100 during the year (either directly or indirectly) for political purposes (see the instructions for definition)?	1b		X
If the answer is "Yes" to 1a or 1b , attach a detailed description of the activities and copies of any materials published or distributed by the foundation in connection with the activities			
c Did the foundation file Form 1120-POL for this year?	1c		X
d Enter the amount (if any) of tax on political expenditures (section 4955) imposed during the year. (1) On the foundation ... <input type="checkbox"/> \$ <u>0</u> (2) On foundation managers ... <input type="checkbox"/> \$ <u>0</u>			
e Enter the reimbursement (if any) paid by the foundation during the year for political expenditure tax imposed on foundation managers ... <input type="checkbox"/> \$ <u>0</u>			
2 Has the foundation engaged in any activities that have not previously been reported to the IRS?	2		X
If "Yes," attach a detailed description of the activities.			
3 Has the foundation made any changes, not previously reported to the IRS, in its governing instrument, articles of incorporation, or bylaws, or other similar instruments? If "Yes," attach a conformed copy of the changes	3		X
4 a Did the foundation have unrelated business gross income of \$1,000 or more during the year?	4a		X
b If "Yes," has it filed a tax return on Form 990-T for this year?	4b	N/A	
5 Was there a liquidation, termination, dissolution, or substantial contraction during the year?	5		X
If "Yes," attach the statement required by General Instruction T.			
6 Are the requirements of section 508(e) (relating to sections 4941 through 4945) satisfied either: ● By language in the governing instrument, or ● By state legislation that effectively amends the governing instrument so that no mandatory directions that conflict with the state law remain in the governing instrument?	6	X	
7 Did the foundation have at least \$5,000 in assets at any time during the yr.? If "Yes," complete Part II, col. (c), & Part XV	7	X	
8 a Enter the states to which the foundation reports or with which it is registered (see instructions) <input type="checkbox"/> CA			
b If the answer is "Yes" to line 7, has the foundation furnished a copy of Form 990-PF to the Attorney General (or designate) of each state as required by General Instruction G? If "No," attach explanation	8b	X	
9 Is the foundation claiming status as a private operating foundation within the meaning of section 4942(j)(3) or 4942(j)(5) for calendar year 2012 or the taxable year beginning in 2012 (see instructions for Part XIV)? If "Yes," complete Part XIV	9	X	
10 Did any persons become substantial contributors during the tax year? If "Yes," attach a schedule listing their names and addresses	10		X

Part VII-A Statements Regarding Activities (continued)

11	At any time during the year, did the foundation, directly or indirectly, own a controlled entity within the meaning of section 512(b)(13)? If "Yes," attach schedule (see instructions)	11		X
12	Did the foundation make a distribution to a donor advised fund over which the foundation or a disqualified person had advisory privileges? If "Yes," attach statement (see instructions)	12		X
13	Did the foundation comply with the public inspection requirements for its annual returns and exemption application? Website address ▶ <u>HTTP://FUSIONPOWER.ORG</u>	13	X	
14	The books are in care of ▶ <u>See attachment #11</u> Telephone no ▶ _____ Located at ▶ _____ ZIP+4 ▶ _____			
15	Section 4947(a)(1) nonexempt charitable trusts filing Form 990-PF in lieu of Form 1041 -- Check here ▶ <input type="checkbox"/> and enter the amount of tax-exempt interest received or accrued during the year ▶ 15 _____			
16	At any time during calendar year 2012, did the foundation have an interest in or a signature or other authority over a bank, securities, or other financial account in a foreign country? See the instructions for exceptions and filing requirements for Form TD F 90-22 1. If "Yes," enter the name of the foreign country ▶ _____	16	Yes	No X

Part VII-B Statements Regarding Activities for Which Form 4720 May Be Required

File Form 4720 if any item is checked in the "Yes" column, unless an exception applies.

		Yes	No
1a	During the year did the foundation (either directly or indirectly):		
(1)	Engage in the sale or exchange, or leasing of property with a disqualified person? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
(2)	Borrow money from, lend money to, or otherwise extend credit to (or accept it from) a disqualified person? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
(3)	Furnish goods, services, or facilities to (or accept them from) a disqualified person? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
(4)	Pay compensation to, or pay or reimburse the expenses of, a disqualified person? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
(5)	Transfer any income or assets to a disqualified person (or make any of either available for the benefit or use of a disqualified person)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
(6)	Agree to pay money or property to a government official? (Exception. Check "No" if the foundation agreed to make a grant to or to employ the official for a period after termination of government service, if terminating within 90 days) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
b	If any answer is "Yes" to 1a(1)-(6), did any of the acts fail to qualify under the exceptions described in Regulations section 53.4941(d)-3 or in a current notice regarding disaster assistance (see instructions)? <input type="checkbox"/> Organizations relying on a current notice regarding disaster assistance check here ▶ <input type="checkbox"/>	1b	X
c	Did the foundation engage in a prior year in any of the acts described in 1a, other than excepted acts, that were not corrected before the first day of the tax year beginning in 2012?	1c	X
2	Taxes on failure to distribute income (section 4942) (does not apply for years the foundation was a private operating foundation defined in section 4942(j)(3) or 4942(j)(5)):		
a	At the end of tax year 2012, did the foundation have any undistributed income (lines 6d and 6e, Part XIII) for tax year(s) beginning before 2012? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If "Yes," list the years . . . ▶ <u>20 09, 20 08, 20 07, 20 06</u>		
b	Are there any years listed in 2a for which the foundation is not applying the provisions of section 4942(a)(2) (relating to incorrect valuation of assets) to the year's undistributed income? (If applying section 4942(a)(2) to all years listed, answer "No" and attach statement -- see instructions.)	2b	X
c	If the provisions of section 4942(a)(2) are being applied to any of the years listed in 2a, list the years here. ▶ 20 __, 20 __, 20 __, 20 __		
3a	Did the foundation hold more than a 2% direct or indirect interest in any business enterprise at any time during the year? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
b	If "Yes," did it have excess business holdings in 2012 as a result of (1) any purchase by the foundation or disqualified persons after May 26, 1969; (2) the lapse of the 5-year period (or longer period approved by the Commissioner under section 4943(c)(7)) to dispose of holdings acquired by gift or bequest; or (3) the lapse of the 10-, 15-, or 20-year first phase holding period? (Use Schedule C, Form 4720, to determine if the foundation had excess business holdings in 2012.)	3b	X
4a	Did the foundation invest during the year any amount in a manner that would jeopardize its charitable purposes?	4a	X
b	Did the foundation make any investment in a prior year (but after December 31, 1969) that could jeopardize its charitable purpose that had not been removed from jeopardy before the first day of the tax year beginning in 2012?	4b	X

Part VII-B Statements Regarding Activities for Which Form 4720 May Be Required (continued)

5a During the year did the foundation pay or incur any amount to:

(1) Carry on propaganda, or otherwise attempt to influence legislation (section 4945(e))? Yes No

(2) Influence the outcome of any specific public election (see section 4955); or to carry on, directly or indirectly, any voter registration drive? Yes No

(3) Provide a grant to an individual for travel, study, or other similar purposes? Yes No

(4) Provide a grant to an organization other than a charitable, etc., organization described in section 509(a)(1), (2), or (3), or section 4940(d)(2)? (see instructions) Yes No

(5) Provide for any purpose other than religious, charitable, scientific, literary, or educational purposes, or for the prevention of cruelty to children or animals? Yes No

b If any answer is "Yes" to 5a(1)-(5), did any of the transactions fail to qualify under the exceptions described in Regulations section 53.4945 or in a current notice regarding disaster assistance (see instructions)? Yes No **5b**

Organizations relying on a current notice regarding disaster assistance check here **5b**

c If the answer is "Yes" to question 5a(4), does the foundation claim exemption from the tax because it maintained expenditure responsibility for the grant? Yes No **5b**

If "Yes," attach the statement required by Regulations section 53.4945-5(d). **5b**

6a Did the foundation, during the year, receive any funds, directly or indirectly, to pay premiums on a personal benefit contract? Yes No **6b**

b Did the foundation, during the year, pay premiums, directly or indirectly, on a personal benefit contract? Yes No **6b**

If "Yes" to 6b, file Form 8870. **6b** X

7a At any time during the tax year, was the foundation a party to a prohibited tax shelter transaction? Yes No **7b**

b If "Yes," did the foundation receive any proceeds or have any net income attributable to the transaction? Yes No **7b**

Part VIII Information About Officers, Directors, Trustees, Foundation Managers, Highly Paid Employees, and Contractors

1 List all officers, directors, trustees, foundation managers and their compensation (see instructions).

(a) Name and address	(b) Title, and avg. hours per week devoted to position	(c) Compensation (if not paid, enter -0-)	(d) Contributions to employee benefit plans and deferred comp.	(e) Expense account, other allowances
See attachment #12 See attachment #13				

2 Compensation of five highest-paid employees (other than those included on line 1 -- see instructions). If none, enter "NONE."

(a) Name and address of each employee paid more than \$50,000	(b) Title, and avg. hours per week devoted to position	(c) Compensation	(d) Contributions to employee benefit plans and deferred compensation	(e) Expense account, other allowances

Total number of other employees paid over \$50,000 **0**

Part VIII Information About Officers, Directors, Trustees, Foundation Managers, Highly Paid Employees, and Contractors (continued)

3 Five highest-paid independent contractors for professional services (see instructions). If none, enter "NONE."

(a) Name and address of each person paid more than \$50,000	(b) Type of service	(c) Compensation
See attachment #16 See attachment #17		

Total number of others receiving over \$50,000 for professional services ▶

Part IX-A Summary of Direct Charitable Activities

List the foundation's four largest direct charitable activities during the tax year. Include relevant statistical information such as the number of organizations and other beneficiaries served, conferences convened, research papers produced, etc.	Expenses
1 See attachment #18	21,066
2 See attachment #19	30,139
3 See attachment #20	47,389
4	

Part IX-B Summary of Program-Related Investments (see instructions)

Describe the two largest program-related investments made by the foundation during the tax year on lines 1 and 2.	Amount
1	
2	
All other program-related investments See instructions.	
3	
Total. Add lines 1 through 3 ▶	

Part X Minimum Investment Return (All domestic foundations must complete this part. Foreign foundations, see instructions.)

1	Fair market value of assets not used (or held for use) directly in carrying out charitable, etc., purposes:		
a	Average monthly fair market value of securities	1a	76,670
b	Average of monthly cash balances	1b	42,837
c	Fair market value of all other assets (see instructions)	1c	296,447
d	Total (add lines 1a, b, and c)	1d	415,954
e	Reduction claimed for blockage or other factors reported on lines 1a and 1c (attach detailed explanation)	1e	
2	Acquisition indebtedness applicable to line 1 assets	2	
3	Subtract line 2 from line 1d	3	415,954
4	Cash deemed held for charitable activities. Enter 1 1/2% of line 3 (for greater amount, see instructions)	4	42,000
5	Net value of noncharitable-use assets. Subtract line 4 from line 3. Enter here and on Part V, line 4	5	373,954
6	Minimum investment return. Enter 5% of line 5	6	18,698

Part XI Distributable Amount (see instructions) (Section 4942(j)(3) and (j)(5) private operating foundations and certain foreign organizations check here and do not complete this part.)

1	Minimum investment return from Part X, line 6	1	18,698
2a	Tax on investment income for 2012 from Part VI, line 5	2a	
b	Income tax for 2012. (This does not include the tax from Part VI.)	2b	
c	Add lines 2a and 2b	2c	
3	Distributable amount before adjustments. Subtract line 2c from line 1	3	18,698
4	Recoveries of amounts treated as qualifying distributions	4	
5	Add lines 3 and 4	5	18,698
6	Deduction from distributable amount (see instructions)	6	
7	Distributable amount as adjusted. Subtract line 6 from line 5. Enter here and on Part XIII, line 1	7	18,698

Part XII Qualifying Distributions (see instructions)

1	Amounts paid (including administrative expenses) to accomplish charitable, etc., purposes:		
a	Expenses, contributions, gifts, etc. -- total from Part I, column (d), line 26	1a	106,881
b	Program-related investments -- total from Part IX-B	1b	
2	Amounts paid to acquire assets used (or held for use) directly in carrying out charitable, etc., purposes	2	125,595
3	Amounts set aside for specific charitable projects that satisfy the:		
a	Suitability test (prior IRS approval required)	3a	
b	Cash distribution test (attach the required schedule)	3b	
4	Qualifying distributions. Add lines 1a through 3b. Enter here and on Part V, line 8, and Part XIII, line 4	4	232,476
5	Foundations that qualify under section 4940(e) for the reduced rate of tax on net investment income. Enter 1% of Part I, line 27b (see instructions)	5	0
6	Adjusted qualifying distributions. Subtract line 5 from line 4	6	232,476

Note. The amount on line 6 will be used in Part V, column (b), in subsequent years when calculating whether the foundation qualifies for the section 4940(e) reduction of tax in those years.

Part XIII Undistributed Income (see instructions)		(a) Corpus	(b) Years prior to 2011	(c) 2011	(d) 2012
1	Distributable amount for 2012 from Part XI, line 7				18,698
2	Undistributed income, if any, as of the end of 2012				
a	Enter amount for 2011 only				
b	Total for prior years 20____, 20____, 20____				
3	Excess distributions carryover, if any, to 2012.				
a	From 2007				
b	From 2008				
c	From 2009				
d	From 2010				
e	From 2011				
f	Total of lines 3a through e	0			
4	Qualifying distributions for 2012 from Part XII, line 4: ▶ \$ <u>232,476</u>				
a	Applied to 2011, but not more than line 2a				
b	Applied to undistributed income of prior years (Election required -- see instructions)				
c	Treated as distributions out of corpus (Election required -- see instructions)				
d	Applied to 2012 distributable amount				
e	Remaining amount distributed out of corpus				
5	Excess distributions carryover applied to 2012 (If an amount appears in column (d), the same amount must be shown in column (a).)				
6	Enter the net total of each column as indicated below:				
a	Corpus. Add lines 3f, 4c, and 4e. Subtract line 5				
b	Prior years' undistributed income. Subtract line 4b from line 2b				
c	Enter the amount of prior years' undistributed income for which a notice of deficiency has been issued, or on which the section 4942(a) tax has been previously assessed				
d	Subtract line 6c from line 6b. Taxable amount -- see instructions				
e	Undistributed income for 2011. Subtract line 4a from line 2a. Taxable amount -- see instructions				
f	Undistributed income for 2012. Subtract lines 4d and 5 from line 1. This amount must be distributed in 2013				18,698
7	Amounts treated as distributions out of corpus to satisfy requirements imposed by section 170(b)(1)(F) or 4942(g)(3) (see instructions)				
8	Excess distributions carryover from 2007 not applied on line 5 or line 7 (see instructions)				
9	Excess distributions carryover to 2013. Subtract lines 7 and 8 from line 6a				
10	Analysis of line 9:				
a	Excess from 2008				
b	Excess from 2009				
c	Excess from 2010				
d	Excess from 2011				
e	Excess from 2012				

Part XIV Private Operating Foundations (see instructions and Part VII-A, question 9)

1a If the foundation has received a ruling or determination letter that it is a private operating foundation, and the ruling is effective for 2012, enter the date of the ruling

b Check box to indicate whether the foundation is a private operating foundation described in section 4942(j)(3) or 4942(j)(5) 4942(j)(3) or 4942(j)(5)

	Tax year				(e) Total
	(a) 2012	(b) 2011	(c) 2010	(d) 2009	
2a Enter the lesser of the adjusted net income from Part I or the minimum investment return from Part X for each year listed.	3,379	2,975	3,074	1,875	
b 85% of line 2a.					
c Qualifying distributions from Part XII, line 4 for each year listed	106,881	129,372	110,229	135,038	
d Amounts included in line 2c not used directly for active conduct exempt act.					
e Qualifying distributions made directly for active conduct of exempt activities. Subtract line 2d from line 2c					
3 Complete 3a, b, or c for the alternative test relied upon:					
a "Assets" alternative test -- enter:					
(1) Value of all assets	415	445,616	453,217	444,381	
(2) Value of assets qualifying under section 4942(j)(3)(B)(i).	415,954	445,616	453,217	444,381	
b "Endowment" alternative test -- enter 2/3 of min. investment return shown in Part X, line 6 for each year listed	18,698	22,407	22,110	23,927	
c "Support" alternative test -- enter:					
(1) Total support other than gross investment income (interest, dividends, rents, payments on securities loans (section 512(a)(5)), or royalties).					
(2) Support from general public and 5 or more exempt organizations as provided in section 4942(j)(3)(B)(iii).					
(3) Largest amount of support from an exempt organization.					
(4) Gross investment income					

Part XV Supplementary Information (Complete this part only if the foundation had \$5,000 or more in assets at any time during the year -- see instructions.)

1 Information Regarding Foundation Managers:

a List any managers of the foundation who have contributed more than 2% of the total contributions received by the foundation before the close of any tax year (but only if they have contributed more than \$5,000). (See section 507(d)(2).)
None

b List any managers of the foundation who own 10% or more of the stock of a corporation (or an equally large portion of the ownership of a partnership or other entity) of which the foundation has a 10% or greater interest.
None

2 Information Regarding Contribution, Grant, Gift, Loan, Scholarship, etc., Programs:
Check here if the foundation only makes contributions to preselected charitable organizations and does not accept unsolicited requests for funds. If the foundation makes gifts, grants, etc. (see instructions) to individuals or organizations under other conditions, complete items 2a, b, c, and d.

a The name, address, and telephone number or e-mail of the person to whom applications should be addressed.

b The form in which applications should be submitted and information and materials they should include:

c Any submission deadlines:

d Any restrictions or limitations on awards, such as by geographical areas, charitable fields, kinds of institutions, or other factors:

Part XV Supplementary Information (continued)

3 Grants and Contributions Paid During the Year or Approved for Future Payment

Recipient	If recipient is an individual, show any relationship to any foundation manager or substantial contributor	Foundation status of recipient	Purpose of grant or contribution	Amount
Name and address (home or business)				
<p>a Paid during the year</p>				
Total				▶ 3a 0
<p>b Approved for future payment</p>				
Total				▶ 3b

Part XVI-A Analysis of Income-Producing Activities

Enter gross amounts unless otherwise indicated.

	Unrelated business income		Excluded by section 512, 513, or 514		(e) Related or exempt function income (See instructions.)
	(a) Business code	(b) Amount	(c) Excl. code	(d) Amount	
1 Program service revenue.					
a See attachment #21					35,782
b _____					
c _____					
d _____					
e _____					
f _____					
g Fees & contracts from government agencies					
2 Membership dues and assessments					53,955
3 Interest on savings and temporary cash investments				53	
4 Dividends and interest from securities				2,212	
5 Net rental income or (loss) from real estate:					
a Debt-financed property					
b Not debt-financed property					
6 Net rental income or (loss) from personal property					
7 Other investment income					
8 Gain or (loss) from sales of assets other than inventory		463			
9 Net income or (loss) from special events					
10 Gross profit or (loss) from sales of inventory					
11 Other revenue: a _____					
b See attachment #22		622			
c _____					
d _____					
e _____					
12 Subtotal. Add columns (b), (d), and (e)		1,085		2,265	89,737
13 Total. Add line 12, columns (b), (d), and (e)			13		93,087

(See worksheet in line 13 instructions to verify calculations.)

Part XVI-B Relationship of Activities to the Accomplishment of Exempt Purposes

Line No. ▼	Explain below how each activity for which income is reported in column (e) of Part XVI-A contributed importantly to the accomplishment of the foundation's exempt purposes (other than by providing funds for such purposes). (See instructions.)
	See attachment #23

Part XVII Information Regarding Transfers To and Transactions and Relationships With Noncharitable Exempt Organizations

- 1** Did the organization directly or indirectly engage in any of the following with any other organization described in section 501(c) of the Code (other than section 501(c)(3) organizations) or in section 527, relating to political organizations?
- a** Transfers from the reporting foundation to a noncharitable exempt organization of:
- (1) Cash **1a(1)** Yes No
 - (2) Other assets **1a(2)** Yes No
- b** Other transactions:
- (1) Sales of assets to a noncharitable exempt organization **1b(1)** Yes No
 - (2) Purchases of assets from a noncharitable exempt organization **1b(2)** Yes No
 - (3) Rental of facilities, equipment, or other assets **1b(3)** Yes No
 - (4) Reimbursement arrangements **1b(4)** Yes No
 - (5) Loans or loan guarantees **1b(5)** Yes No
 - (6) Performance of services or membership or fundraising solicitations **1b(6)** Yes No
- c** Sharing of facilities, equipment, mailing lists, other assets, or paid employees **1c** Yes No
- d** If the answer to any of the above is "Yes," complete the following schedule. Column (b) should always show the fair market value of the goods, other assets, or services given by the reporting foundation. If the foundation received less than fair market value in any transaction or sharing arrangement, show in column (d) the value of the goods, other assets, or services received.

(a) Line no.	(b) Amount involved	(c) Name of noncharitable exempt organization	(d) Description of transfers, transactions, and sharing arrangements

2 a Is the foundation directly or indirectly affiliated with, or related to, one or more tax-exempt organizations described in section 501(c) of the Code (other than section 501(c)(3)) or in section 527? Yes No

b If "Yes," complete the following schedule.

(a) Name of organization	(b) Type of organization	(c) Description of relationship

Under penalties of perjury, I declare that I have examined this return, including accompanying schedules and statements, and to the best of my knowledge and belief, it is true, correct, and complete. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledge.

Sign Here *John O. Dean* 106-28-13 **PRESIDENT** May the IRS discuss this return with the preparer shown below (see instructions)? Yes No

Paid Preparer Use Only

Print/Type preparer's name	Preparer's signature	Date	Check <input checked="" type="checkbox"/> if self-employed	PTIN
Firm's name ▶ RONALD H THOMAS CPA	<i>Ronald H Thomas</i>	06-24-2013		P00128697
Firm's address ▶ 11301 SPUR WHEEL LANE			Firm's EIN ▶ 52-0880202	Phone no. (301) 983-0330

Schedule B
(Form 990, 990-EZ,
or 990-PF)

Department of the Treasury
Internal Revenue Service

Schedule of Contributors

▶ Attach to Form 990, Form 990-EZ, or Form 990-PF.

OMB No 1545-0047

2012

Name of the organization

Employer identification number

FUSION POWER ASSOCIATES

52-1162794

Organization type (check one):

Filers of:

Section:

Form 990 or 990-EZ

501(c)() (enter number) organization

4947(a)(1) nonexempt charitable trust **not** treated as a private foundation

527 political organization

Form 990-PF

501(c)(3) exempt private foundation

4947(a)(1) nonexempt charitable trust treated as a private foundation

501(c)(3) taxable private foundation

Check if your organization is covered by the **General Rule** or a **Special Rule**.

Note. Only a section 501(c)(7), (8), or (10) organization can check boxes for both the General Rule and a Special Rule. See instructions.

General Rule

For an organization filing Form 990, 990-EZ, or 990-PF that received, during the year, \$5,000 or more (in money or property) from any one contributor. Complete Parts I and II.

Special Rules

For a section 501(c)(3) organization filing Form 990 or 990-EZ that met the 33 1/3% support test of the regulations under sections 509(a)(1) and 170(b)(1)(A)(vi) and received from any one contributor, during the year, a contribution of the greater of (1) \$5,000 or (2) 2% of the amount on (i) Form 990, Part VIII, line 1h or (ii) Form 990-EZ, line 1. Complete Parts I and II.

For a section 501(c)(7), (8), or (10) organization filing Form 990 or 990-EZ that received from any one contributor, during the year, total contributions of more than \$1,000 for use exclusively for religious, charitable, scientific, literary, or educational purposes, or the prevention of cruelty to children or animals. Complete Parts I, II, and III

For a section 501(c)(7), (8), or (10) organization filing Form 990 or 990-EZ that received from any one contributor, during the year, contributions for use exclusively for religious, charitable, etc., purposes, but these contributions did not total to more than \$1,000. If this box is checked, enter here the total contributions that were received during the year for an exclusively religious, charitable, etc., purpose. Do not complete any of the parts unless the **General Rule** applies to this organization because it received nonexclusively religious, charitable, etc., contributions of \$5,000 or more during the year ▶ \$ _____

Caution. An organization that is not covered by the General Rule and/or the Special Rules does not file Schedule B (Form 990, 990-EZ, or 990-PF), but it **must** answer "No" on Part IV, line 2 of its Form 990; or check the box on line H of its Form 990-EZ or on Part I, line 2, of its Form 990-PF, to certify that it does not meet the filing requirements of Schedule B (Form 990, 990-EZ, or 990-PF).

For Paperwork Reduction Act Notice, see the Instructions for Form 990, 990-EZ, or 990-PF.

Schedule B (Form 990, 990-EZ, or 990-PF) (2012)

Name of organization **FUSION POWER ASSOCIATES** Employer identification number **52-1162794**

Part II **Contributors** (see instructions). Use duplicate copies of Part I if additional space is needed.

(a) No.	(b) Name, address, and ZIP + 4	(c) Total contributions	(d) Type of contribution
1	AMERICAN PHYSICAL SOCIETY ONE PHYSICS ELLIPSE COLLEGE PARK MD 20740	\$ 5,000	Person <input checked="" type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)
2	IEEE 445 HOES LANE PISCATAWAY NJ 20740	\$ 5,000	Person <input checked="" type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)
		\$	Person <input type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)
		\$	Person <input type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)
		\$	Person <input type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)
		\$	Person <input type="checkbox"/> Payroll <input type="checkbox"/> Noncash <input type="checkbox"/> (Complete Part II if there is a noncash contribution.)

990 SCHEDULE OF OTHER INCOME

Attachment 1: page 1 - 990-PF Page 1, Part I, Line 11

Open to Public Inspection For calendar year 2012 or tax period beginning , and ending

Name of Organization **FUSION POWER ASSOCIATES** Employer Identification Number **52-1162794**

Description of Other Income	Revenue and Expenses	Net Investment Income	Adjusted Net Income
DUES	53,955		
MEETINGS AND SEMINARS	28,225		
SUBSCRIPTIONS	7,557		
Totals:	89,737		

990 SCHEDULE OF LEGAL FEES

Attachment 2: page 1 - 990-PF Page 1, Part I, Line 16a

Open to Public Inspection	For calendar year 2012, or tax period beginning , and ending
---------------------------	--

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
--	---

Legal Description	Amount	Net Investment Income	Adjusted Net Income	Disbursements for Charity
ATTORNEY	145	145	145	
Total:	145	145	145	

990 SCHEDULE OF ACCOUNTING FEES

Attachment 3: page 1 - 990-PF Page 1, Part I, Line 16b

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization **FUSION POWER ASSOCIATES** Employer Identification Number **52-1162794**

Accounting Category	Amount	Net Investment Income	Adjusted Net Income	Disbursements for Charity
RETURN PREPARATION	950	90	90	860
Total:	950	90	90	860

990 SCHEDULE OF OTHER PROFESSIONAL FEES

Attachment 4: page 1 - 990-PF Page 1, Part I, Line 16c

Open to Public Inspection	For calendar year 2012, or tax period beginning _____, and ending _____
Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794

Category	Amount	Net Investment Income	Adjusted Net Income	Disbursements for Charity
Total:				

990 SCHEDULE OF TAXES PAID

Attachment 5: page 1 - 990- PF Page 1, Part I, Line 18

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization **FUSION POWER ASSOCIATES** Employer Identification Number **52-1162794**

Category	Amount	Net Investment Income	Adjusted Net Income	Disbursements for Charity
REAL ESTATE TAX	4,714	282	282	4,432
Total:	4,714	282	282	4,432

990 SCHEDULE OF DEPRECIATION

Attachment 6: page 1 - 990-PF Page 1, Part I, Line 19

Open to Public Inspection

For Calendar year 2012, or tax year period beginning

and ending

Name of Organization

Employer Identification Number

FUSION POWER ASSOCIATES

52-1162794

Description of Property	Date Acquired	Cost or Other Basis	Prior Year Depreciation	Method of Computation	Rate
OFFICE CONDO					
Total:					
Life Years	Depreciation This Year	Net Investment Income	Acquired Net Income	Cost of Goods Sold	
	2,580				
Total:	2,580				

990 OTHER EXPENSES SCHEDULE

Attachment 7: page 1 990-PF Page 1, Part I, Line 23

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization **FUSION POWER ASSOCIATES** Employer Identification Number **52-1162794**

Description of Activity	Revenue and Expenses	Net Investment Income	Adjusted Net Income	Disbursements for Charity
OFFICE EXPENSES	10,543	100	100	10,443
FUSION ENGINEERING AWARD	500			
Total:	11,043	100	100	10,443

990 SCHEDULE OF LAND, BUILDING & EQUIPMENT

Attachment 8: page 1 - 990-PF Page 2, Part II, Line 14

Open to Public
Inspection

For Calendar year 2012, or tax year period beginning

and ending

Name of Organization

Employer Identification Number

FUSION POWER ASSOCIATES

52-1162794

Category or Description of Property	Cost or Other Basis	Accumulated Depreciation	End of Year Book Value	Ending FML (990-PF Only)
LAND	56,805		56,805	70,000
CONDO	77,400	70,950	6,450	200,000
FURNITURE	35,169	35,169		1,000
Total:	169,374	106,119	63,255	271,000

990 SCHEDULE OF OTHER INCREASES

Attachment 9: page 1 - 990- PF Page 2, Part III, Line 3

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization Employer Identification Number
FUSION POWER ASSOCIATES 52-1162794

Description of Increase	Total Amount

Total:

990 PART IV CAPITAL GAINS AND LOSSES FOR TAX ON INVESTMENT INCOME

Attachment 10: page 1 - 990-PF Page 3, Part IV, line 1

Open to Public Inspection	For calendar year 2012 or tax period beginning	, and ending
---------------------------	--	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
--	---

	(a) List and Describe the Kind(s) of Property Sold (e.g., Real Estate, 2-story Brck Warehouse; or Common Stock, 200 shs. MLC Co.)	(b) How Acquired P -- Purchase D -- Donation	(c) Date Acquired (mo., day, yr.)	(d) Date Sold (mo., day, yr.)
1	MUTUAL FUNDS GAIN	P	05-05-2005	12-31-2012
2	UNREALIZED GAIN	P	05-05-2000	12-31-2012

	(e) Gross Sales Price	(f) Depreciation Allowed (or allowable)	(g) Cost or Other Basis Plus Expense of Sale	(h) Gain or (loss) (e) Plus (f) Minus (g)
1	493			493
2	622			622

Complete only for assets showing gain in column (h) and owned by the foundation on 12/31/69				
	(i) F.M.V. as of 12/31/69	(j) Adjusted Basis as of 12/31/69	(k) Excess if Col. (i) Over Col. (j), if Any	(l) Gains (Col. (h) Gain Minus Col. (k), But Not Less Than -0-) or Losses (from col. (h))
1				493
2				622

990 BOOKS ARE IN CARE OF

Attachment 11 - 990-PF Page 5, Part VII-A, Line 14

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization FUSION POWER ASSOCIATES Employer Identification Number 52-1162794

Part VII-A - Line 14

Individual Name RUTH WATKINS

or Business Name.

Street Address 2 PROFESSIONAL DR #249

U.S. Address:

Zip code 20879 City Gaithersburg State MD

Foreign Address

City

Province or State

Country

Postal code

Phone Number (301) 258-0545

Fax Number

990 CURRENT OFFICERS, DIRECTORS, TRUSTEES, AND KEY EMPLOYEES

Attachment 12: page 1 - 990-PF Page 6, Part VIII

Open to Public Inspection	For calendar year 2012, or tax period beginning _____, and ending _____
------------------------------	---

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
--	---

(A) Name and Address	(B) Title and Average Hrs. per Week	(C) Compensation (If not paid, enter 0)	(D) Cont to Employee Ben. Plans & Def. Comp.	(E) Expense Account & Other Allowances
STEPHEN O DEAN 2 PROFESSIONAL DR #249 Gaithersburg, MD 20879	PRESIDENT 20.00	37,700		
See Comp. Expl. #1 RUTH WATKINS 2 PROFESSIONAL DR #249 Gaithersburg, MD 20879	VICE PRES			
LIST ATTACHED USA,	DIRECTORS			

990 COMPENSATION EXPLANATION

Attachment 13: page 1 - 990-PF Page 6, Part VIII, Officer Compensation Explanation

Open to Public
Inspection

For Calendar year 2012, or tax year period beginning

and ending

Name of Organization

Employer Identification Number

FUSION POWER ASSOCIATES

52-1162794

Name	Explanation
Officer Comp. Expln. #1 STEPHEN O DEAN	MANAGE PROGRAMS

990 SUMMARY OF DIRECT CHARITABLE ACTIVITIES

Attachment 18: page 1 - 990-PF Page 7, Part IX-A, Line 1

Open to Public Inspection	For calendar year 2012, or tax period beginning	, and ending
---------------------------	---	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
---	--

Charitable Activity
PUBLISH A BIMONTHLY NEWSLETTER THAT REPORTS ON TECHNICAL DEVELOPMENTS RELATED TO FUSION POWER. SEE ATTACHED DETAIL AND COPIES OF NEWSLETTERS. ATACHMENT IX-A.

990 SUMMARY OF DIRECT CHARITABLE ACTIVITIES

Attachment 19: page 1 - 990-PF Page 7, Part IX-A, Line 2

Open to Public Inspection	For calendar year 2012, or tax period beginning	, and ending
---------------------------	---	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
---	--

Charitable Activity
SPONSORING CONFRENCES, FORUMS AND OTHER STUDIES TO ASSESS THE TECHNOLOGICAL

990 SUMMARY OF DIRECT CHARITABLE ACTIVITIES

Attachment 19: page 2 - 990-PF Page 7, Part IX-A, Line 2

Open to Public Inspection	For calendar year 2012, or tax period beginning	, and ending
---------------------------	---	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
---	--

Charitable Activity
ADVANCES OF FUSION POWER GENERATION. SEE DETAILS IX-A

990 SUMMARY OF DIRECT CHARITABLE ACTIVITIES

Attachment 20: page 1 - 990-PF Page 7, Part IX-A, Line 3

Open to Public Inspection	For calendar year 2012, or tax period beginning	, and ending
---------------------------	---	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
---	--

Charitable Activity
RESERCH AND ANALYSAES IN FUSION. SEE ATTACHED IX-A

990 PART VII - ANALYSIS OF INCOME-PRODUCING ACTIVITIES

Attachment 21: page 1 - 990-PF Page 12, Part XVI-A, Line 1

Open to Public Inspection For calendar year 2012, or tax period beginning , and ending

Name of Organization **FUSION POWER ASSOCIATES** Employer Identification Number **52-1162794**

Item	Program Service Revenue	Unrelated Business Income		Excluded by Section 512, 513 or 514		(e) Related or Exempt Function Income (see instructions)
		(a) Bus Code	(b) Amount	(c) Exc Code	(d) Amount	
a	MEETINGS					28,225
b	SUBSCRIPTIONS					7,557
Totals:						35,782

990 SCHEDULE OF OTHER REVENUE

Attachment 22: page 1 - 990-PF Page 12, Part XVI-A, Line 11

Open to Public Inspection	For calendar year 2012, or tax period beginning _____, and ending _____
------------------------------	---

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
--	---

Item	Program Service Revenue	Unrelated Business Income		Excluded by Section 512, 513 or 514		(e) Related or Exempt Function Income (see instructions)
		(a) Business Code	(b) Amount	(c) Excl. code	(d) Amount	
a	UNREALIZED GAINS		622			
Totals:			622			

**990 SCHEDULE OF RELATIONSHIP OF ACTIVITIES
TO THE ACCOMPLISHMENT OF EXEMPT PURPOSES**

Attachment 23: page 1 990-PF Page 12, Part XVI-B

Open to Public Inspection	For calendar year 2012, or tax period beginning	, and ending
---------------------------	---	--------------

Name of Organization FUSION POWER ASSOCIATES	Employer Identification Number 52-1162794
---	--

Line Number	Briefly Describe How the Activity Reported in Column (E) of Part VII Specifically Contributed to the Accomplishment of The Organization's Exempt Purposes (other than by providing funds for such purposes)
1	MEETINGS HELD TO DISCUSE FUSION ADVANCEMENTS.
2	NEWS LETTERS INFORM READERS OF CURRENT ADVANCEMENTS IN FUSION.
3	RESEARCH IS CONTINUING TO SEARCH FOR NEW IDEAS ON FUSION.

Mr. Tony Taylor
General Atomics
P.O. Box 85608
San Diego, CA 92186

Mr. Tom Weaver
The Boeing Company
P.O. Box 516
St. Louis, MO 63166

Dr. Francois Waelbroeck
Institute for Fusion Studies
University of Texas
1 University Station C1500
Austin TX 78712

Dr. Glen A. Wurden
Fusion Energy Program Manager
Los Alamos National Laboratory
P O. Box 1663 E-526
Los Alamos NM 87545

**Fusion Power Associates
Attachments to 990 PF 2012**

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MC 0438
La Jolla CA 92093-0438

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Berkeley CA 94720

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Dr. Mark Tillack, VP, Communications
University of California, San Diego
La Jolla, CA 92120

Ms. Ruth Watkins, VP, Administration and Finance
Fusion Power Associates
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Gaithersburg, MD 20879

52-1162794
Fusion Power Associates
Attachment to 990PF 2012

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Dr. Keith Matzen, Director
Pulsed Power Program
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Albuquerque NM 87185

Dr. Robert L. McCrory, Director
Laboratory for Laser Energetics
University of Rochester
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Rochester NY 14623

Dr. Dale Meade (retired)
Princeton Plasma Physics Laboratory
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Princeton NJ 08540

Dr. Stan Milora, Director
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Dr. Stephen Obenshain, Head
Laser Physics Branch (Code 6730)
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Washington DC 20375

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Dr. Miklos Porkolab, Director
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167 Albany Street
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Princeton, NJ 08540

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1070 Rome Drive
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Fusion Power Report

Complete Coverage Of Worldwide Fusion Developments

Vol. 33 No. 7/8

July/August 2012

Page 21

SLANTS & TRENDS

USDOE Fusion Energy Sciences Advisory Committee (FESAC) launches new study of US fusion program priorities.

See Story on page 22

* * *

The ITER Council met in Washington, DC 20-21 June – stating “respecting the project schedule within costs remains a critical issue”.

See Story on page 22

* * *

US ITER Project Manager Ned Sauthoff reports “more than 85% of superconducting wire strand production for the US contribution to the (ITER) toroidal field magnets has been completed”.

See Story on page 22

* * *

American Nuclear Society Fusion Energy Division tells Congress “the (President’s) FY 2013 budget request (for fusion) by the Administration endangers the United States’ domestic fusion program as well as our country’s scientific contributions to the ITER project”.

See Story on page 22

* * *

A contract covering the design of a 100-kilometer long network of cable trays for the whole ITER installation was awarded to the Korean company KEPCO, a company that specializes in the construction of nuclear power plants.

See Story on page 23

* * *

The International Atomic Energy Agency (IAEA) has established a series of annual fusion DEMO Programme Workshops.

See Story on page 25

A workshop on “Advanced Controls and Diagnostics for Confinement Improvement of Compact Toroids” will be held September 25-28.

See Story on page 25

Carl D. Henning, a key contributor to fusion research and magnet engineering, died June 13, 2012 in Livermore, CA, at the age of 73.

See Story on page 26

Inside This Issue

*USDOE FESAC Launches
New Priorities Study Page 22*

*ITER Council Meets
In Washington, DC. Page 22*

*US ITER Project Manager
Notes Progress Page 22*

*ANS Fusion Energy Division
Comments on FY 2013 Budget..... Page 22*

*ITER Progress Reported
On a Broad Front Page 23*

*Workshops Planned
On Demo and Compact Concepts.. Page 25*

*Carl D. Henning
Passes Page 26*

Calendar Page 26

FESAC Launches New Study

The DOE Fusion Energy Sciences Advisory Committee (FESAC) has launched a new assessment "of priorities among and within the elements of the magnetic fusion energy sciences program." The study was requested by DOE Office of Science Director William F. Brinkman in the wake of President Obama's Fiscal Year 2013 budget proposal to reduce funding for the (non-ITER) US domestic fusion effort by \$48 M (16%). Brinkman states in an April 13 charge letter to FESAC, "Note that General Plasma Science and High-Energy-Density Laboratory Physics programs" and US contributions to ITER "are not part of this charge".

FESAC has established a panel under the chairmanship of FESAC member Bob Rosner (U, Chicago). They are asked to "prioritize among and within the FY 2013 elements of the non-ITER magnetic fusion portion of the Fusion Energy Sciences program" under three budget cases: (1) "the 2013 Presidential budget request level of effort", (2) "a restoration of the budget to the 2012 level for that part of the program", and (3) "a program that has a substantially enhanced emphasis on fusion materials science".

Brinkman gave the FESAC no target date to complete the study but sources indicate FESAC hopes to complete the study by the end of this summer.

The charge letter and list of panel and FESAC members are posted at: <http://fire.pppl.gov>

ITER Council Meeting

During its tenth meeting held on 20-21 June in Washington D.C., the ITER Council acknowledged a number of positive advancements for the project, noting, in particular, the progress of ITER construction and licensing.

The Council stressed that respecting the project schedule within cost remains a critical issue and that reported slippages need rapid correction; it also noted that the ITER Organization and the seven Domestic Agencies are working together on these corrections. Relative to schedule issues, decisions were taken regarding the manufacturing of some major ITER Tokamak components.

US ITER Progress

US ITER Project Manager Ned Sauthoff reports that "US ITER continues to make good progress on design and R&D activities and, where relevant, fabrication. He notes that "over 90% of the preliminary design will be completed by June 2012 for

the following US contributions: central solenoid, toroidal field conductor, tokamak cooling water system, vacuum auxiliary systems, steady state electrical network, ion cyclotron transmission lines, and two diagnostic instruments." He states that "more than 85% of superconducting wire strand production for the US contribution to the toroidal field magnets has been completed by Luvata Waterbury and Oxford Superconducting Technologies. The US is responsible for 8% of the toroidal field conductor.

Sauthoff states that over \$767 million (in total value with options) has been awarded to US vendors and obligated to DOE labs from the ITER Project Office. The DOE has not publicly divulged its current estimate for the total cost of the US commitment to ITER but DOE ITER Federal Project Director Bill Cahill states, "Current indications are that there is engagement to reach consensus on a realistic, affordable funding profile" and that "we hope to have resolution on a potential (funding) profile by the end of this summer." Sources in the fusion community have said they expect the total US cost to approach \$2.5 billion.

ANS Statement on FY 2013 Budget

A statement prepared by the American Nuclear Society (ANS) Fusion Energy Division on the President's FY 2013 fusion budget was sent to key members of Congress on April 10, 2012.

The letter states, in part, "The FY-2013 budget request by the Administration endangers the United States' domestic fusion program as well as our country's scientific contributions to the ITER international project. If implemented, the FY-2013 budget reductions will deal a major blow to the U.S. fusion research program and further erode its leadership position. After years of operating on minimal budgets and essentially level funding, the U.S. fusion program cannot withstand the proposed reductions without significant negative impacts."

The letter says, "U.S. fusion researchers were told a few years ago that there would be some "belt tightening" to divert fusion research funds to ITER construction. Without any quantitative guidance from the DOE on belt-tightening, there was speculation that it might be 1% or perhaps even as much as a 5% budget reduction for a few years. The FY 2013 budget, however, proposes a 16% reduction (\$45 million) of fusion research funds, and DOE officials have given warnings that reductions of up to \$100 million more will be needed in the coming years. If the Administration's FY-2013 budget is

implemented, the DOE will close a unique fusion experiment, the Alcator machine at MIT, and the students and staff there will be dispersed. Deeper cuts in the future will disperse even more staff and students at institutions around the country who would use the ITER results, and greatly reduce the number of American engineers and scientists who will be educated and trained in fusion."

The letter asks, "We urge the U.S. to consistently and adequately support the fusion research program as outlined in the Energy Policy Act of 2005 (PL 109-58, sec 971-972) and reverse this position, restoring funds to the domestic fusion program budget and, separately, fully funding this nation's promised annual ITER contribution."

The complete text is archived at <http://fti.neep.wisc.edu/fednews>

ITER Update

Cable Trays. A contract covering the design of a 100-kilometer long network of cable trays for the whole ITER installation was awarded to the Korean company KEPCO, a company that specializes in the construction of nuclear power plants. The contract includes seismic analysis and supporting structures; routing of all 6,000 kilometres of cables; production of materials for cables and cable trays; production of the manufacturing drawings for cable trays; and cable installation reports. In addition, this contract will provide support to the systems for the cable data collection, development of cabling and termination diagrams.

Cryodistribution System. A Procurement Arrangement was signed with the Indian Domestic Agency for ITER's cryodistribution system. The main role of the cryodistribution system is the controlled distribution of cryogenic helium various systems and components within ITER, such as the superconducting magnets, the cryopumps and the thermal shields. The contract covers the finalization of the design and the manufacturing, installation and testing of the entire cryodistribution system on the ITER site, terminating with the final commissioning of the components in 2019. The cryodistribution system represents the fourth and last in-kind Procurement Arrangement for ITER's cryogenic systems; it is also the third signed with India. One in-cash Procurement Arrangement remains for the Liquid Helium Plant, which is to be signed later this year.

Ion Cyclotron Transmission Lines. Engineers at the Oak Ridge National Laboratory recently completed a new test stand for US ITER to demonstrate

that large-scale 12-inch coaxial transmission lines can perform at ITER specifications for the ion cyclotron heating system. Testing to demonstrate continuous 6 MW operations will begin within the next month at ORNL's Energy Systems Test Complex. "These transmission lines are not off-the-shelf components," Rick Goulding, a scientist in the Plasma Technology and Applications Group at ORNL's Fusion Energy Division said. "They have to carry up to 6 MW each. This is roughly a factor of 3 higher than any radio frequency transmission line that has ever been built for fusion research, and in addition it must operate steady state." The ion cyclotron resonance ring test stand will also test specific high power components such as gas barriers, phase shifters, coaxial switches, tuning stubs, capacitors and directional couplers. When their tests are completed, the researchers will be able to confirm that the transmission lines, as well as components with moving parts such as capacitors, will be ready to transfer power efficiently from the transmitters into the antennas and finally into the plasma.

Ion Cyclotron Heating and Current Drive Systems. The Indian Domestic Agency has signed two contracts for the development of the Radio Frequency (RF) sources forming part of ITER's Ion Cyclotron Heating and Current Drive (IC H&CD) system. The contracts were signed with the American company Continental Electronics Corporation and with Thales Electron Devices, France.

The IC H&CD system is one of the major tools for achieving the plasma performances foreseen in ITER's operation scenarios. This system is designed to provide 20 MW into the plasma, at frequencies included in the band 40 MHz to 55 MHz. ITER India is in charge of the procurement of the RF sources subsystem and the corresponding Procurement Arrangement was signed in February 2010. A total of nine RF sources will be provided: eight sources used for plasma operation, plus one spare.

Electron Cyclotron High Voltage Power Supplies. The ITER Organization concluded its 75th Procurement Arrangement, for the Electron Cyclotron High Voltage Power Supplies with the European Domestic Agency. The high voltage power supply forms the backbone of the electron cyclotron plant, providing up to 90 kV and 50A to each of the twenty-four 1MW microwave sources. The power supplies provide a high regulation of the applied voltages to actively control delivered power to the plasma based on the plasma requirements. The high regulation is based on the Pulse Step Modulation technique, which essentially stacks several smaller power supplies (or modules) in se-

ries. A rapid controller turns each module on and off to provide an accuracy of ± 1 percent and modulation frequencies of up to 5kHz.

ITER Correction Coils. The manufacturing line for the ITER correction coils was inaugurated in Hefei, China on 28 April in the presence of leaders from the Chinese Domestic Agency for ITER, the Anhui Provincial Department of Science and Technology, the Institute of Plasma Physics Chinese Academy of Sciences (ASIPP), experts, and representatives of sub-suppliers. This marks the official launch of correction coil production task. "The correction coils are part of the ITER magnet system and they will play a key role in ITER's performance," said Luo Delong, vice director of Chinese Domestic Agency. "All of the correction coils will be manufactured and provided by China. No matter how difficult the task is, we must complete it on time, and with high quality. I hope that ASIPP can take advantage of this opportunity to improve the technology and processes in superconducting magnet manufacturing."

Progress in Russia. The volume of Russia's annual contributions to ITER has reached EUR 150 million. This year 78 contracts were signed for the execution of works and supply of ITER equipment. In the city of Glazov some 1,000 km east of Moscow, a whole new plant was built for the production of ITER's superconductors. A cabling facility has been built in Podolsk and a jacketing factory in Protvino. At the Efremov Institute in St. Petersburg a High Heat Flux Facility was created, as well as the manufacturing lines for the first wall, divertor and poloidal field coil 1. The cryogenic engineering company JSC Cryogenmash, located in Balashikha near Moscow, is in charge of the design and construction of ITER's Port Plug Test Facility Stands. The Institute of Applied Physics in Nizhny Novgorod has manufactured the prototype of the ITER gyrotron, which it successfully tested at the Kurchatov Institute at the required 1MW of power during 1000 seconds. In total, about 30 Russian companies are currently under contract with the ITER Project Center, private institution of the state-owned company Rosatom and each of these contracts "pulls along" a whole chain of contractors and subcontractors.

Safety Letter. The official letter from the French Safety Authority (*Agence de sûreté nucléaire - ASN*) that the ITER Organization received on 20 June marks a major milestone in a lengthy, complex and demanding process that began a year and a half ago. The ASN has judged that the ITER Organization's proposal on the operational conditions and design of the installation fulfils the expected safety requirements at this stage of the licensing

process. In simpler words, this is the long-expected green light meaning that the French government authorizes the construction of ITER. In practical terms, a peer committee of ASN and ITER Safety, Quality & Security experts will now work on drafting the decree that will be submitted to the French government's signature. This highly detailed document can be described as "the safety contract" that will bind the ITER Organization (as nuclear operator) and the French State for the whole duration of the installation's lifetime. The final decree that should be signed by the French President or his Prime Minister is expected to be issued in the last months of 2012.

AC/DC Converter Contracts in China

Following the signature in April 2011 of the Procurement Arrangement for ITER's AC/DC Converters and the Reactive Power Compensator and the Harmonic Filters, the Chinese Domestic Agency awarded contracts to two domestic suppliers for these systems. The first face-to-face meeting between responsible engineers from the ITER Organization, their counterparts from the Chinese Domestic Agency and suppliers ASIPP (for the AC/DC Converters) and Rongxin Power Electronic (for the Reactive Power Compensator and Harmonic Filters) was recently held at the ITER Headquarters. The Procurement Arrangement is based on a functional specification describing the technical requirements of the system; the challenge now is to jointly develop the detailed design. "The meeting was very successful and efficient," said Ashok Mankani, Power Converter Project Engineer. "It should be considered a good start on the road to developing a better understanding of the scope of this Procurement Arrangement, the interfaces and the next milestones that have to be achieved."

The AC/DC converters components are essential for supplying DC power to ITER's poloidal field coil circuits with the operating requirements of 55 kA and 1.35 kV to 4 kV. The large capacity of 3x250 Mvar reactive power at 66 kV is essential for the stability and performance of ITER's power system.

Toroidal Field Conductor Shipped from China to Japan. An important milestone in the procurement of toroidal field conductor for ITER was recently achieved in China. On 26 February, 660 metres of completed toroidal field dummy conductor was lifted onto a truck in Hefei and taken to the port in Shanghai. From there it took to sea in the direction of Japan. The event was symbolic in two ways: this was the first ITER component completed in China, and—for the ITER project—it was the first shipment of completed component between

ITER Members. On 10 March, the packaged toroidal field dummy conductor arrived in Fukuoka, Japan where it will be stored at the Wakamatsu site until further processing. Mr. Luo Delong, Deputy Director-General of the Chinese Domestic Agency, commented: "This milestone is a major step for the ITER project. It is a symbol of the commitment of China turned reality. Our goal is that all procurement items from China be supplied in accordance with the ITER schedule and with ITER quality requirements."

Jacketing Line Completed in Italy. The Italian Consortium for Applied Superconductivity (ENEA, Tratos Cavi, Criotec) has completed the commissioning of the jacketing line and the equipment needed for the manufacturing of conductors for ITER and JT60-SA in less than one year. In the fields of Chivasso, 20 km outside Turin, a manufacturing facility has been erected to fabricate and carry out the rigorous qualification process for the conductors. Outside the facility, a platform measuring 800 metres has been assembled to guide the 10-ton, 760-metre-long toroidal field copper dummy conductor into the facility.

The jacketing was completed after assembling all the sub-components provided by contractors. Tratos Cavi produced the cable, which was then handed over to Criotec to be inserted into stainless steel tube composed of 58 individual sections welded together. Subsequently, the dummy conductor was compacted and spooled. Following the successful validation process, the conductor was packed into a 100-cubic-metre box for shipment to a facility in La Spezia (Italy), where the consortium responsible for the fabrication of the toroidal field winding packs will carry out trials.

Europe to Manufacture 60 ITER Divertor Cassettes

The Procurement Arrangement for the Divertor Cassette and Assembly was signed on Tuesday, 19 April. It covers the manufacturing by Europe of 60 cassette bodies (54 cassettes plus 6 spares) and the integration of the components and diagnostics systems provided by other Domestic Agencies as part of different procurement packages. "The key challenges in this PA are: one, the manufacturing tolerance to meet the interfaces (on the order of a fraction of a millimetre); and two, the assembly sequence of the different divertor components," explains Mario Merola, head of the Internal Components Division. "Planning and coordination will be paramount." Following the production of a full-scale prototype for assembly trials, series production should begin in 2015. The present schedule plans for the installation of all 54 cassettes beginning in 2021 during the second phase of ITER as-

sembly; the divertor will only be needed when hydrogen-helium operation begins in 2022.

For further information on ITER progress visit www.iter.org and click on Iter Newslines.

IAEA to Host Demo Workshop

The International Atomic Energy Agency (IAEA) has established a series of annual fusion DEMO Programme Workshops to facilitate international collaboration on defining and coordinating DEMO programme activities.

The first IAEA DEMO Programme Workshop (DPW-2012) will be held at the University of California at Los Angeles (UCLA), Los Angeles, California, United States of America from 15 - 18 October 2012. The specific objective of DPW-2012 is to discuss a subset of key DEMO scientific and technical issues with the aim of defining the facilities and programme activities that can lead to their resolution. The workshop output will be information that could be used by any party as input to the planning of possible roadmaps to DEMO.

DPW-2012 will be organized around three topics, where discussion and action are urgently needed. The topics include:

1. Fusion Power Extraction and Tritium Fuel Cycle
2. Plasma Power Exhaust and Impurity Control
3. Magnetic Configuration and Operating Scenario for a Next-Step Fusion Nuclear Facility

All oral presentations at DPW-2012 will be based on invitation only. Participants should be actively involved in the topics of the meeting. In order to participate in the meeting, all persons not officially invited by the IAEA to give a presentation at the meeting must send a completed Participation Form (Form A) to their appropriate governmental authority for subsequent transmission to the IAEA. Such a participant will be accepted only if the Participation Form is transmitted to the IAEA through one of the official channels by **10 August 2012**.

Additional information will be made available on the workshop web site at <http://advprojects.pppl.gov/Roadmapping/IAEADEMO/index.asp>

Compact Concepts Workshop

A workshop on "Advanced Controls and Diagnostics for Confinement Improvement of Compact Toroids" will be held September 25-28 at the Fairmont Newport Beach (CA) Hotel. The confer-

ence will include an afternoon tour of Tri Alpha Energy's C-2 experimental facility on September 27.

Included in the scope of the workshop are FRC, spheromak, RFT and ST concepts. Recent advances to be discussed include feedback control of the external magnetic field, pulsed poloidal current drive, plasmoid/helicity injection by plasma guns or flux cores, neutral beam injection, and divertor biasing.

A more detailed workshop announcement and registration/hotel information can be obtained by sending an email to CT2012@trialphaenergy.com

In Memoriam: Carl D. Henning

Carl D. Henning, a key contributor to fusion research and magnet engineering, died June 13, 2012 in Livermore, CA, at the age of 73.

Carl was a mechanical engineer, having received his BS from Ohio University and his PhD from the University of Michigan. He spent most of his career at the Lawrence Livermore National Laboratory where he held many senior management and technical leadership positions in research toward controlling nuclear fusion as an energy source. Carl was responsible for building the world's largest magnet at that time (for MFTF-B). He also designed massive containment vessels for stemming the oil fires in Kuwait after the first Gulf War.

Carl spent two years on assignment in Germany as a member of the US contingent of scientists designing the International Thermonuclear Experimental Reactor, ITER. He spent three years at Inermagnetics General Corporation as VP for Technology Development where he contributed to the development of an MRI machine for General Electric.

In 1976-1978 he worked at the Dept. of Energy as Magnetics Branch Chief in the Office of Fusion Energy. He was author of many technical papers and presentations, held five U.S. patents, and received numerous honors and awards, including being elected a Fellow of the American Nuclear Society.

He is survived by his wife of fifty years, Judy, and his two daughters, Kirsten Baca of Walnut Creek and Lisa Low of Danville, two granddaughters, Brooke Baca and Lexie Low, and his sister, Joy Arndt of Cleveland, OH. Condolences may be sent to his wife, Judy, at 4435 First Street, #343, Livermore, CA 94551.

Calendar

July 2-7 39th European Physical Society Conference on Plasma Physics. Stockholm, Sweden. <http://www.spp.ee.kth.se/eps-iccp-2012/>

July 8-12 ICOPS 2012. Edingurgh, UK. <http://icops2012.lboro.ac.uk/>

July 10-11 US-China Magnetic Fusion Collaboration Workshop. San Diego, CA. gtynan@ucsd.edu

Aug 12-17 19th International Symposium on Heavy Ion Inertial Fusion. Berkeley, CA <http://hif12.lbl.gov/>

Aug 27-31 20th ANS Topical Meeting on Fusion Energy (TOFE). Nashville, TN. <http://tofe012.org>

Aug 27-31 10th International Workshop on Non-neutral Plasmas. Greifswald, Germany. Contact: anja.schultz@ipp.mpg.de

Aug 27-31 Summer School and International Symposium on the Physics of Ionized Gases. Zrenjanin, Serbia. <http://www.spig2012.pmf.uns.ac.rs/>

Sep 3-14 6th International School on Fusion Technologies. Karlsruhe, Germany.

Sep 17-21 IPP Summer University on Plasma Physics and Fusion Research. Garching, Germany.

Sep 24-28 27th Symposium on Fusion Technology (SOFT). Liege, Belgium.

Sep 25-28 Compact Concept Workshop. Newport Beach, CA. CT2012@trialphaenergy.com

October 8-13 24th IAEA Fusion Energy Conference. San Diego, CA.

Oct 12-Nov 2 54th APS Division of Plasma Physics Meeting. Providence, Rhode Island. <http://www.aps.org/units/dpp/meetings/dpp12>

December 5-6 Fusion Power Associates 33rd Annual Meeting and Symposium. Washington, DC. <http://fusionpower.org>



Fusion Power Report

Complete Coverage Of Worldwide Fusion Developments

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Page 33

SLANTS & TRENDS

ITER Superconductors passing tests, leading to optimism that superconductor manufacture for the ITER magnets will soon begin.

See Story on page 34

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ASDEX Upgrade experiments demonstrate new technique for reducing heat load on tokamak divertor plates needed for exhaust power handling.

See Story on page 34

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A New Divertor Magnetic Field Configuration, dubbed the Snowflake Divertor, has been tested at several sites in Switzerland and the US. Concept received a 2012 R&D 100 Award.

See Story on page 34

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The ITER Organization wrestles with a decision on whether to change the baseline ITER divertor design from a carbon-based divertor material to tungsten.

See Story on page 34

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JET and Tore Supra are providing key data on carbon and tungsten material to ITER divertor designers.

See Story on page 35

An article on fusion posted on the October 18 New York Times Opinion Page draws numerous comments, including one from President Obama's Science Advisor.

See Story on page 36

The IAEA is publishing a new book: Fusion Physics they call "a comprehensive reference for graduate students and an invaluable guide for more experienced researchers.

See Story on page 36

Inside This Issue

<i>ITER Superconductors</i> <i>Pass Tests</i>	<i>Page 34</i>
<i>ASDEX demonstrates</i> <i>Tokamak Exhaust Technique</i>	<i>Page 34</i>
<i>Snowflake Divertor</i> <i>Wins Award</i>	<i>Page 34</i>
<i>The ITER Divertor</i> <i>Carbon or Tungsten?</i>	<i>Page 34</i>
<i>JET and Tore Supra</i> <i>Focus on ITER Support</i>	<i>Page 35</i>
<i>President Obama's Science Advisor</i> <i>Comments on Fusion</i>	<i>Page 36</i>
<i>IAEA Publishing</i> <i>Fusion Physics book</i>	<i>Page 36</i>
<i>Calendar</i>	<i>Page 36</i>

ITER Magnet Progress

One of the first systems to be manufactured under the ITER Organization (IO) Integrated Schedule Plan is the superconductor for the ITER magnet system. The Russian Toroidal Field (TF) conductor with strands underwent tests in the SULTAN facility by *Centre de Recherches en Physique des Plasmas- Ecole Polytechnique Fédérale de Lausanne* (CRPP-EPFL) in late September — early October 2012. This is the fourth Russian sample to be tested in SULTAN but the first sample containing two sections of conductor made of real production length which will be used to manufacture real TF coils for the machine.

The results obtained with the Russian sample show very good agreement with results of previous samples, which demonstrated the relatively good stability of the conductor during electromagnetic cycling, as well as its good durability during the warm-up/cool-down procedure.

Testing the latest sample is viewed by the IO as a very important milestone which completed the pre-production phase of the TF conductor procurement process. This means the final production stage can now proceed. At the same time, it opens the way to start shipping the real conductors to the coil manufacturer so they can be used to make coils for the ITER tokamak.

For further information on ITER progress see <http://www.iter.org>

ASDEX Demonstrates Fusion Power Handling Technique

A major challenge to tokamak operation is removing the hot fusion plasma exhaust from the tokamak core through a "divertor" without exceeding the heat removal capacity of the divertor plate material.

The ASDEX Upgrade tokamak in Germany has recently successfully demonstrated a new technique for enhancing the functioning of the divertor plasma exhaust system. This was achieved using a fast feedback control system to inject small amounts of argon into the main space and of nitrogen directly in front of the divertor plates, thereby actively cooling the plasma edge.

The injected gas particles are excited to luminescence on contact with the hot plasma. The energy is thus gently removed from the plasma as ultraviolet or x-ray light. Unlike in the hot core, where this cooling effect of impurities has to be avoided, it is very useful at the edge of the plasma: Before the fast plasma particles impinge on the divertor plates,

they have already lost their energy to the nitrogen and argon atoms.

For more information on this technique, visit: http://www.ipp.mpg.de/ippcms/eng/presse/pi/12_12_pi.html

The Snowflake Divertor

Removing hot plasma from a tokamak core is typically done through a magnetic exhaust channel called a "divertor." In today's experiments, the heat load on the divertor materials does not present a major challenge. However, in future tokamaks, such as ITER and power plants, the much larger heat loads will require new solutions. One promising technique, tested at today's power levels but thought to be capable of scaling to larger systems, was recently demonstrated on ASDEX Upgrade in Germany (see article above).

Another innovative design, called the Snowflake Divertor, originally suggested and analyzed by Dmitri Ryutov and colleagues at the Lawrence Livermore National Laboratory (LLNL), has also been successfully tested in recent experiments at the Center for Research in Plasma Physics in Switzerland (CRPP), and at the Princeton Plasma Physics Laboratory (PPPL) and General Atomics (GA) in the United States.

The Snowflake Divertor configuration fans out the magnetic field lines in the exhaust channel into a shape resembling a snowflake, thus spreading the heat over a large enough surface to reduce the power density to what would be a manageable level for a future commercial power plant.

In addition to successful experimental tests of the configuration on a small tokamak at CRPP, tests were also successful on the larger NSTX tokamak at PPPL. More recently, successful tests were conducted on the DIII-D tokamak at General Atomics. The teams at LLNL, CRPP, PPPL, and GA received a 2012 R&D 100 Award from R&D Magazine for their work.

For more information, contact Dmitri Ryutov at ryutov1@llnl.gov

The ITER Divertor

There are not many options when it comes to choosing the material of a divertor, through which the high temperature plasma exhaust is removed from the reaction chamber. Fifty years of experience in tokamak technology have narrowed them to two: it's either a carbon fiber composite (CFC) or tungsten, their respective advantages or disadvan-

tages depending on the plasma regimes to which they are exposed.

In ITER, it was originally planned to begin operations with a primarily CFC divertor and replace it with a full tungsten divertor before the start of nuclear operation (deuterium + tritium) in 2026 (now 2027). After years of discussions, panels and reviews, a new plan was proposed and ITER is now considering doing without the first-phase CFC divertor. Indeed, substantial cost reductions would be achieved by installing a tungsten divertor right from the start and operating it well into the nuclear phase. This solution would also provide for early training, during the non-nuclear phase of ITER operation, on how to operate with a tungsten divertor. The ITER Members, however, have not yet reached a unanimous position on this issue.

Beginning with a carbon material was considered to have several advantages for the start of ITER operations, given its proven range of compatibility with a number of plasma conditions in present devices, particularly at low densities with significant additional heating. Its use would considerably ease the development of techniques for the control and mitigation of plasma instabilities (Edge Localized Modes and disruptions) which, even in the lower power conditions characteristic of the non-active phases of ITER operation, can generate heavy heat pulse transients. Unlike carbon, which sublimates, tungsten melts and there was a real concern that the very short duration, high heat fluxes that can be deposited during these transients could yield deformations of the precise material surfaces, compromising subsequent operation.

Largely due to the high level of tritium retention expected as a consequence of fuel co-deposition with carbon eroded from divertor target surfaces, ITER intended to replace the first carbon/ tungsten divertor with an all-tungsten variant before the start of the deuterium and deuterium-tritium plasma operation phases. However, the required high heat flux tungsten technology had never been tested in the demanding environment of a tokamak under the steady state plasma heat fluxes ($\sim 10\text{-}20\text{ MWm}^{-2}$) expected on divertor surfaces during ITER fusion plasma operation. Moreover, the fabrication of the ITER divertor with full-tungsten armor in the high heat flux strike point regions, represented an unprecedented technological challenge.

For the past two years the Joint European Torus (JET) facility has been strongly focussed on the issues associated with ITER design choices and the preparation of ITER operation, as have other tokamaks around the world. To this end, the materials of the plasma facing components (PFCs) in JET

were replaced with the same combination foreseen in ITER, namely a combination of Be for the main wall and the possible use of tungsten for the divertor. The installation of the "ITER-like wall" required more than 3000 tiles to be fitted by remote handling manipulators and interfaces. In addition to the new wall, JET installed several upgrades to active protection systems and diagnostics, vertical stability control and heating capability with an increase of the routinely-available neutral beam power up from 20 MW to 30 MW. The on-going studies and results obtained so far are providing important data to the ITER design team and have demonstrated agreement with hoped-for expectations.

The French superconducting tokamak, Tore Supra, which has been operating on a site adjoining the ITER site since 1988, is also focused on providing data for ITER materials choices. It was the first tokamak to successfully implement superconducting magnets and actively-cooled plasma-facing components. Over the past twenty-four years, Tore Supra has explored the physics of long-duration plasma pulses, reaching a record of 6.5 minutes in December 2003.

In 2000-2002, Tore Supra was equipped with a new carbon-carbon fibre composite (CFC) "limiter" — the equivalent of the planned first phase divertor in ITER — capable of withstanding an ITER-relevant heat load of 10 MW per square metre. This project, named CIEL for *Composants Internes Et Limiteurs*, demonstrated that, while CFC performs very well in terms of power handling and compatibility with the plasma, its use results in substantial erosion caused by the physico-chemical reactions between the carbon of the limiter and the hydrogen (deuterium) in the plasma. Further experiments in JET confirmed these observations.

A feasibility study named 'WEST' (acronym derived from W Environment in Steady-state Tokamak, where W is the chemical symbol for tungsten), was launched on 25th February 2010, aimed at getting answers in a timely manner for the then-planned second phase divertor for the (nuclear) phase of ITER. Alain Bécoulet, the Head of CEA-IRFM (*Institut de Recherche sur la Fusion Magnétique*) which operates Tore Supra, says, "By installing an ITER-like full tungsten divertor in Tore Supra, we can turn our platform into a test-bench on ITER critical path. We can thus contribute to reducing the risk and to saving time and money for ITER." Adapting Tore Supra to accommodate a full tungsten divertor — 500 components with a total of 15,000 tungsten tiles — is a challenge the Institute is ready to take on, says Bécoulet, (All carbon will have to be taken out of the device; in-vacuum ves-

sel magnetic coils will need to be installed in order to modify the plasma shape from circular to "D-shaped" and heating systems will have to be adapted to the new configuration.)

The formal decision to proceed with the WEST project on Tore Supra is due to be taken at the end of 2012.

Holdren Comments on New York Times Fusion Posting

Non-fiction science and environmental writer Andrew Revkin posted a lengthy article on the October 18 New York Times online Opinion Page titled "With Tight Research Budgets, Is There Room for the Eternal Promise of Fusion?" The article includes a lengthy assessment of the current status of both inertial and magnetic fusion programs by Stanford physicist Burton Richter. The full article can be accessed at:

<http://dotearth.blogs.nytimes.com/2012/10/18/with-tight-research-budgets-is-there-room-for-the-eternal-promise-of-fusion/http://dotearth.blogs.nytimes.com/2012/10/18/with-tight-research-budgets-is-there-room-for-the-eternal-promise-of-fusion/>

The article is followed by numerous comments submitted by readers. One of them is from President Obama's science advisor, John Holdren.

Holdren writes: "I think it's about as clear and balanced an account as could be fit into this amount of space. If I were to add a little bit, I'd note that both magnetic and inertial-confinement fusion studies can stand comparison with most other domains of "big physics" fundamental research, in terms of the pace at which they have generated new knowledge in physics as well as spin-off technologies useful in other domains of science and practice. If somebody wanted a lot more, I'd refer them to the opening chapters of the PCAST review of the US fusion research program that I chaired for President Clinton in 1995, which is at <http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-95-fusion.pdf> (The later chapters are somewhat dated, of course, but the opening ones outline the rationale for pursuing fusion research and the metrics for evaluating it in a way I'm still happy with.)"

JOHN P. HOLDREN, PhD Assistant to the President for Science and Technology and Director, Office of Science and Technology Policy Executive Office of the President of the United States

New Book: Fusion Physics

The International Atomic Energy Agency (IAEA) is publishing a new book: Fusion Physics, edited by M. Kikuchi, K. Lackner and M. Tran.

The publication "is a comprehensive reference book for graduate students and an invaluable guide for more experienced researchers." It features specialized chapters presenting the main research and development concepts in fusion physics.

The Table of Contents is as follows:

The Case for Fusion
Physics of Confinement
Equilibrium and Macroscopic Stability of Tokamaks
Plasma Diagnostics
Plasma Heating and Current Drive by Neutral Beam and Alpha Particles
Radiofrequency Waves, Heating and Current Drive in Magnetically Confined Plasmas
Plasma-Wall Interactions
Helical Confinement Concepts
The Broader Spectrum of Magnetic Configurations for Fusion
Inertial Fusion Energy.

More information is available at <http://www.iaea.org/books> where ordering information is also posted

Orders may be sent to sales.publications@iaea.org

Orders placed before November 30 qualify for a 50 percent discount over the list price of 90 Euros.

It is also available for download, (34 MB) without charge at

http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1562_web.pdf

Calendar

December 5-6 Fusion Power Associates 33rd Annual Meeting and Symposium. Washington, DC. <http://fusionpower.org>



Fusion Power Report

Complete Coverage Of Worldwide Fusion Developments

SLANTS & TRENDS

US Congress Passes FY 2012 Budget, which includes full requested funding for ITER.

See Story on page 2

Riccardo Betti, inertial fusion scientist from University of Rochester, is chosen as a recipient of the prestigious DOE Lawrence Award

See Story on page 2

ITER Director-General Osamu Motojima issues year-end statement on ITER progress.

See Story on page 2

DOE Under Secretary for Science Steven Koonin departed DOE on November 18.

See Story on page 4

The European Union reaches agreement on ITER funding for the next two years.

See Story on page 4

The ITER Council met in November and issues press release praising progress, noting "a highly productive period of project execution under the ITER Organization's leadership, including the successful efforts to advance ITER design and construction, contain costs and minimize delays . . ."

See Story on page 4

About 600 industrialists from more than 20 countries participated in the second ITER Business Forum to discuss issues such as the design status of ITER components and the strategy for their procurement.

See Story on page 6

Since 2007, the ITER Organization has signed 66 Procurement Arrangements, representing more than 75% of the projects in-kind value.

See Story on page 6

Inside This Issue

<i>US Congress Passes FY 2012 Budget</i>	<i>Page 2</i>
<i>Riccardo Betti Chosen For DOE Lawrence Award</i>	<i>Page 2</i>
<i>ITER Director-General Issues Year-End Statement</i>	<i>Page 2</i>
<i>DOE Under Secretary Koonin Leaves Post</i>	<i>Page 4</i>
<i>European Union Solves ITER Funding Issue</i>	<i>Page 4</i>
<i>ITER Council Meets Praises Progress</i>	<i>Page 4</i>
<i>Industry Representatives Meet To Discuss ITER Plans</i>	<i>Page 6</i>
<i>ITER Organization Signs 66 Procurement Arrangements</i>	<i>Page 6</i>
<i>Calendar</i>	<i>Page 6</i>

U.S. Congress Passes FY 2012 Budget

The U.S. Congress has finally passed an "omnibus" appropriations bill funding the U.S. government for Fiscal Year 2012, which began October 1, 2011. The bill includes funding for the Department of Energy (DOE) and its fusion effort.

The bill provides \$25.8 B for the DOE as a whole, compared to the President's request level of \$29.5 B. The DOE Office of Science will receive \$4.9 B, compared to the President's request level of \$5.4 B and the FY 2011 appropriation of \$4.8 B. Within DOE, the National Nuclear Security Administration (NNSA) will receive \$11 B, compared to the President's request level of \$11.7 B and its FY 2011 appropriation of \$10.5 B. The Office of Fusion Energy Sciences (OFES) is within the Office of Science and the Inertial Confinement Fusion (ICF) Program is within NNSA.

The bill provides OFES with \$402 M, compared with the President's request of \$400 M and the FY 2011 appropriation of \$376 M. The report accompanying the bill states:

"The conference agreement provides \$402,177,000 for Fusion Energy Sciences, of which not more than \$105,000,000 is for U.S. contributions to ITER. The conference agreement includes \$24,741,000 for the High Energy Density Laboratory Plasma Program, of which \$12,000,000 is to be evenly distributed among heavy-ion fusion, laser-driven fusion and magneto-inertial fusion. The conference agreement includes direction for the submission of a 10--year fusion plan as provided by both the House and Senate."

The bill provides the ICF program with \$476 M, the same as the President's request level. The report accompanying the bill states:

"The conferees provide \$476,274,000 for the Inertial Confinement Fusion and High Yield Campaign, which includes \$62,500,000 for Omega at the University of Rochester, \$48,000,000 for the Z facility at Sandia National Laboratory, and \$5,000,000 for the Naval Research Laboratory, as requested."

Riccardo Betti to Receive DOE Lawrence Award

US Secretary of Energy Steven Chu has announced the winners of the 2011 Ernest Orlando Lawrence Award for their outstanding contributions in research and development supporting the Department of Energy and its missions. Nine winners were named in eight categories. Winners in each cate-

gory will receive a gold medal, a citation and \$20,000. In the case of co-nomination, the honorarium is shared. Winners will be honored at a ceremony in Washington, DC, in early 2012.

"These researchers have made significant contributions to the national, economic, and energy security of the United States," Secretary Chu said. "I congratulate the winners and thank them for their work on behalf of the Department and the Nation."

The Lawrence Award was established in 1959 to honor the memory of Dr. Ernest Orlando Lawrence who invented the cyclotron (a particle accelerator), and after whom two major Energy Department laboratories in Berkeley and Livermore, California are named.

Fusion researcher Riccardo Betti was among those selected. His citation reads:

Riccardo Betti (University of Rochester) Fusion and Plasma Sciences

Riccardo Betti will be honored for a series of impactful theoretical discoveries in the physics of inertial confinement fusion including seminal transformative work on thermonuclear ignition, hydrodynamic instabilities and implosion dynamics, and the development of innovative approaches to ignition and high energy gains.

He can be reached at betti@me.rochester.edu

ITER Director-General Motojima Issues Year-End Statement

ITER Director-General Osamu Motojima issued the following year-end statement:

I would like to take this opportunity to report on the latest project developments. Directly after the last meeting of the ITER Council in November, during which the delegates confirmed the choices made in policy and strategy to advance the design and construction of ITER, I set off on a mission to Japan and China.

On 24 November I was asked to give a testimony on the status of the ITER project to the Special Committee on Science, Technology and Innovation of the Japanese House of Representatives, chaired by Mr. Isao Matsumiya. The meeting lasted for almost three hours and the Representatives, of course, had many questions. They wanted to know how "solid" the ITER project was, what is its present status, how safe the machine will be, etc. All in all, it was a very encouraging meeting. It will help the Japanese Representatives to understand and to

further endorse the importance of fusion and to explain this necessity to their constituents. I had another very constructive meeting the next day—this time with the Parliamentary Association and its President Yoriyoshi Matsuno and Secretary General Hirofumi Ryu. This Association was only established recently to support ITER. The idea to establish such a group was floated during lunch at the Château de Cadarache when a delegation of Japanese Members of Parliament visited ITER on 11 October this year. They said they would hold their first meeting during my next visit to Japan, and they did. The Association, which will act as a "bridge between the Japanese government and the ITER project," is growing fast. More than 100 Parliament Representatives got together to celebrate the inauguration, among them the former ministers of MEXT, Mr. Takeo Kawamura and Mr. Kenji Kosaka, who are extremely supportive of our project.

From Tokyo, my wife and I flew to Beijing to the Ministry of Science and Technology (MOST), where I met Vice-Minister Cao Jianlin to discuss the ITER project schedule, its cost, and human resource issues in depth. I expressed my sincere appreciation for China's continuous support to ITER and for their understanding of the series of reforms we have undertaken to ensure successful project implementation during the construction phase. Mr. Cao replied by reassuring me that China would keep to its commitments and complete its fabrication tasks on time. Besides in-cash and in-kind contribution, China is planning to strengthen its human resource support to the ITER Organization in the coming few years, including sending more visiting researchers and providing more expertise.

The next stop before I moved on to Hefei was the Chinese Domestic Agency where I gave a comprehensive presentation on the project's status, the impact of the Fukushima earthquake and tsunami on the overall project schedule, and the strategic management plan of ITER. I was happy to get this opportunity to exchange views with the staff and experts at the Chinese Domestic Agency. Hefei is the hometown of the Institute of Plasma Physics at the Chinese Academy of Sciences (ASIPP) and the home of the EAST Tokamak. This was my first trip to ASIPP since attending the second EAST International Advisory Committee meeting in October 2006 and I must say that it was with both great pleasure and great excitement that I returned. I was cordially received by ASIPP Director Li Jiangang together with Academician Wan Yuanxi, the former chairman of the ITER Science and Technology Advisory Committee (STAC), Deputy-Directors Wan Baonian, Fu Peng and Wu Xinchao, and representatives from the ITER Domestic Agency

(ITER China) and ASIPP ITER office officials. Professor Li presented an overview of recent research progress at EAST and ITER activities at ASIPP. In his talk, he emphasized that the development of 40 diagnostic tools, the achievement of long-pulse H-mode, and other research performed on EAST will provide "a wealth of experience" for ITER. "We want ITER to succeed, as we are all in the same boat," Jiangang Li said, as he assured me of ASIPP's strong commitment to ITER. The following day I attended a very moving ceremony hosted by ASIPP that celebrated the delivery of the first 780-metre Cu dummy conductor for ITER's toroidal field coils. This is the first ITER component "made in China." Of this, 640 metres will be shipped to Japan and the other 140 metres to Europe for testing. Needless to say, the ceremony in China celebrated a major milestone toward the success of the ITER project. In front of some fifty participants, I was invited—together with Vice Minister Cao Jianlin of MOST—to ignite an electric-optic ball to symbolize the transport of the first component and the "ignition of the shared dream of fusion energy." Together with Minister Cao I also attended the ITER Training Forum hosted by the University of Science & Technology of China (USTC). Vice Minister Cao gave a speech on the "Fusion Energy Development strategy in China and ITER," which left no doubt about the country's intention to take fusion energy to the power grids. I, in return, gave a keynote speech on the progress of the ITER project and the improvements made.

In order to promote academic and scientific cooperation between the ITER Organization and the USTC, President Hou Jianguo and I signed a Memorandum of Understanding. The key to our cooperation will be the training of young fusion scientists—a worthy pursuit, which I also emphasized in the speech I gave on the occasion of receiving a USTC Honorary Professorship. I feel very honored receiving this commendation and I wish to thank President Hou and all the USTC staff once more for the nice arrangement and their hospitality. It is my goal to open the door of ITER to young people who will in fact have the responsibility in the future to carry fusion research forward and to develop the ITER Organization to become a true Center of Excellence.

With these words I would like to close my column and take the opportunity to thank all of you for the excellent work accomplished this year. And what a year it was: The tragedy that happened in Fukushima and consequences on the project's manufacturing schedule as well as the tight budget together with the worries about the European funding have exposed our nerves to a rather unique stress test. Nevertheless, we have managed to overcome the

challenges—and more. ITER is coming out of the ground and, having witnessed what is happening in industry, I can say we are definitely moving from design to real components. But our job is not done yet. Building ITER is a long-distance run and so I hope you will enjoy the Christmas break with friends and family to relax and recharge your batteries and to get ready for the excitement to come!

Thank you and see you in the New Year.
Osamu Motojima, ITER Director-General

Steve Koonin Leaves DOE

Dr. Steven Koonin, DOE Under Secretary of Science, departed the US Department of Energy November 18. The fusion community will sorely miss him since he has been especially active in the area of inertial confinement fusion. He arranged for the Academies of Science and Engineering to conduct a review of the potential of inertial fusion for energy applications. That study is still ongoing. He also has been conducting quarterly reviews of progress towards achieving fusion ignition in the National Ignition Facility (NIF). He was a recipient of Fusion Power Associates Leadership Award in 1994 for the guidance he provided to the inertial fusion program at that time.

Energy Secretary Steven Chu issued the following announcement:

Dear Colleagues,

I write to let you know that Under Secretary of Science Steve Koonin has informed me that he will be leaving the Department on November 18. Steve will be joining the Institute for Defense Analyses' Science and Technology Policy Institute.

Steve's service has been integral to the successes of this Department over the past two and a half years. He has played a central role in bringing the Department's deep technical capabilities in scientific simulation to bear on the Nation's energy challenges through such initiatives as Exascale computing and the multi-scale simulation of energy systems. He has provided invaluable technical counsel to the NNSA on nuclear security matters. His leadership in developing the Department's Strategic Plan has given us a blueprint for addressing the nation's energy, environmental, and nuclear challenges through transformative science and technology solutions. Most importantly, Steve led the first-ever DOE Quadrennial Technology Review, which defines DOE's technology policy role and gives us a framework to strategically prioritize and balance the Department's energy portfolio.

While we will miss Steve's leadership, our Science enterprise will continue to be well served by Dr. Bill Brinkman, Director of the Office of Science, and the dedicated professionals who work with him.

The impressive work that has been accomplished by this organization is due to the efforts of all of you – some of the most talented and dedicated public servants with whom I have had the privilege of working.

Please join me in thanking Steve for his distinguished service.

Steven Chu

ITER Update

EU Agrees to ITER Funding

A full agreement was achieved by the European Council, the European Parliament and the European Commission on the funding of ITER for the next two years. "I am relieved that the extra financial needs of ITER are now covered," stated EU Budget Commissioner Janusz Lewandowski. "The EU could not afford to lose credibility vis-à-vis its international partners involved in the project. Furthermore, I am pleased that this budgetary deal was made possible thanks to the positive spirit shown by the representatives of both the Council and the Parliament."

The "ad referendum" agreement will now have to be formally adopted by the two institutions according to their internal procedures. The agreement foresees the following breakdown of funds:

- EUR 100 million that is already included in the 2012 budget on the ITER budget line;
- EUR 360 million in commitments that will be made available in the 2013 budget procedure without resorting to increasing the Multiannual Financial Framework ceilings;
- EUR 840 million in increased commitment ceilings in Heading 1a—competitiveness for growth and employment—for 2012 (EUR 650 million) and 2013 (EUR 190 million). The increase will be compensated by decreasing commitments in Heading 2 (Natural resources) by EUR 450 million in 2011 and Heading 5 (Administration) in 2011 and 2012 by EUR 390 million all together.

ITER Council Meeting in November

In November, during its ninth meeting in Cadarache (France), the Council noted "a highly productive period of project execution under the ITER Organization's leadership, including the successful efforts to advance ITER design and construction,

contain costs and minimize delays, especially in the face of the Great East Japan earthquake." This ITER Council meeting was chaired by Academician Evgeny Velikhov. Dr. Hideyuki Takatsu of Japan will succeed him as Chairman of the ITER Council on 1 January, 2012.

After the meeting, the Council issued the following press release:

CADARACHE, France (18 November 2011).

On 17 and 18 November 2011, the ITER Council, the Governing Body of the ITER Organization, convened for its ninth meeting, which brought together representatives from the seven ITER Members: China, the European Union, India, Japan, Korea, Russia and the United States under the chairmanship of Academician Evgeny Velikhov (Russia).

Council members recognized that under the leadership of the new management since the previous ITER Council held in June 2011, the ITER Organization has taken a number of positive steps in improving management, gaining control of costs and making technical decisions that will enable continued effective project construction. Council members were also informed on the positive outcome of the public inquiry, which allowed citizens to express their opinions and to ask questions about the project. On 19 September, the public inquiry commission, on the basis of these contributions, issued a 'favourable' opinion on the ITER project. This is a key step towards the full licensing of ITER.

The Council commended the development of a strategic management plan to minimize potential delays due, in part, to the earthquake in Japan. In particular, the Council confirmed that the project is within the schedule and cost decided at its extraordinary meeting in July 2010. The ITER Council noted that 60 Procurement Arrangements have been signed, representing 71.5 percent of the total procurement value of ITER construction. Council endorsed the cost strategy proposed by the ITER Organization to stay within the capped budget.

The Council noted the high quality of the report of the Management Assessor that recognizes the positive impact of the new leadership while giving detailed recommendations to promote further improvements. A report on the implementation of these recommendations by the ITER Organization's Director-General will be made at the next ITER Council meeting in June 2012 (IC-10).

Following the completion of the term of Academician Evgeny Velikhov as the ITER Council Chair, Dr. Gyung-Su Lee as the MAC (Management Advisory Committee) Chair and Prof. Wan Yuanxi as

the STAC (Science and Technology Advisory Committee) Chair at the end of this calendar year, the Council elected Dr Hideyuki Takatsu, Dr. Ranjay Sharan and Prof. Joaquin Sanchez as their respective successors. Council members thanked the outgoing Chairs for their contribution and welcomed the new Chairs.

ITER Power Supplies Progress

The Procurement Arrangement with the Korean Domestic Agency for the AC/DC Converters (signed in March) had led to the selection and award of a contract in August to a consortium led by Dawonsys Co. Ltd. who will design and build the converters, and Hyosung Co. Ltd. who will design and build the converter transformers.

Toroidal Field Coil Conductor Progress

In Russia, the qualification of the manufacturing process for the Toroidal Field (TF) conductor was successfully concluded. Following the manufacture of 760 metres of toroidal field copper dummy conductor in August the full-scale dummy was tested successfully on 20-21 September at the NRC Kurchatov Institute.

In the presence of a representative from the European Domestic Agency, the full-scale copper dummy successfully passed the global leak test, the hydrostatic pressure test, and the pressure drop test. The dummy conductor was then extracted from the vacuum vessel and prepared for transportation to Italy, where it will be tested and qualified.

These positive results show the readiness of the Russian industry (manufacturers JSC TVEL and JSC VNIKP) to produce the conductors on industrial basis.

Diagnostic Neutral Beam Progress

Work begun in 2009 on the civil construction works of the Indian Test Facility in Ahmedabad is now completed: here, the Indian Domestic Agency will install a full-scale test bed for the qualification of all diagnostic neutral beam parameters before installation and operation in ITER.

ITER's neutral beam system will consist of two heating neutral beams (HNB) and a diagnostic neutral beam (DNB) that share the same negative ion source technology. The purpose of the diagnostic neutral beam is to determine the level of impurities (helium ash) and a variety of performance parameters such as ion temperature, particle density and velocity by sending a 100 keV probe beam into the ITER plasma.

Extensive R&D is underway to resolve the numerous technical challenges of these systems: for the

heating neutral beams that are under European and Japanese procurement, the PRIMA test facility in Padua, Italy will house a full-scale prototype of ITER's heating neutral beam injector (MITICA). Here, too, the development of the ITER ion source will be advanced in the SPIDER facility with Indian participation.

The Indian Test Facility will replicate all aspects of ITER's diagnostic neutral beam except remote handling. The civil construction for the facility was completed in August 2011 and the foundations are now in place to receive the beam line. The Indian Domestic Agency is in the process of reviewing the technical specifications of the DNB components before turning to industry for the procurement of the diagnostic neutral beam components

Industry Roles

About 600 industrialists from more than 20 met in Manosque to participate in the ITER Business Forum. Organized for the second time since the inauguration of project, the two-day event was a useful platform for representatives of industry to meet ITER management and technical responsible officers and to discuss issues such as the design status of ITER components and the strategy for their procurement.

"The Business Forum is a necessary event in order to inform and involve industry at an early stage," stated the Director of Agence ITER France Jérôme Paméla in his opening address. "Without industry, there would be no ITER project." In his status report on the project, ITER Deputy Director-General Rich Hawryluk, head of the Department for Administration, also highlighted the importance of exchange with industry: "It is great to have an idea on paper, but only industry can make it become reality."

Procurement Arrangement Signings

During the month of December, six Procurement Arrangements (PAs) were signed, bringing the total for calendar year 2011 to 19. Since 2007, the ITER Organization has signed 66 PAs, representing more than 75 percent of the project's in-kind value. Another sixty are in the pipeline: the total number of PAs for the ITER project is currently forecast to be 126.

On 12 December the PA for the Port Plug Test Facility was signed with the Russian Domestic Agency. This Facility will enable the testing of the upper and equatorial port plugs before their installation in the machine. The following day, the European Domestic Agency countersigned the contract for the R&D and preparatory design of the mag-

netic electronics and software needed for ITER's diagnostic systems.

On 21 December, Russia signed a second PA, this time for the High Field Side Reflectometer, part of the diagnostic system. Also on 21 December, the PA for the Blanket Remote Handling System—necessary for the remote replacement of blanket modules inside of the ITER vacuum vessel during machine maintenance operations—was signed with the Japanese Domestic Agency.

A further two PAs were signed by the ITER Organization: Power Supply for the Heating Neutral Beam and the High Voltage Bushing for MITICA which is part of the Neutral Beam Test Facility. These two PAs, signed by ITER Director-General Osamu Motojima, are currently with the Japanese Domestic Agency, which has committed to sign them before the end of the year.

Other News

The ITER Organization and the University of Science and Technology of China (USTC) have signed a Memorandum of Understanding "to promote cooperation and exchange in all academic and scientific fields of mutual interest and to advance the training of young fusion researchers." As one of the top-ranking universities in China, USTC encompasses an extensive range of disciplines and experts in various fields of relevance to the development of fusion.

Calendar

Jan 29-Feb3 2012 Joint International Stellarator/Heliotron Workshop and 10th Asia Pacific Plasma Theory Conference.
<http://hinf.anu.edu.au/Plasma2012/>

Feb 28-29 Fusion Energy Sciences Advisory Committee (FESAC) meeting. Bethesda, Maryland.
Contact albert.opdenaker@science.doe.gov

March 1 Fusion Day 2012 in Washington, DC.
Contact: jgroenin@princeton.edu

April 17-20 European Energy Conference.
<http://www.energy-conference.eu/>

May 7-11 17th Joint Workshop on Electron Cyclotron Emission and Electron Cyclotron Resonance Heating. The Netherlands.
<http://www.rijnhuizen.nl/ec17>