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Chairman Gregory B. Jaczko US Nuclear Regulatory Commission Washington, D.C. 20555-0001

5 May 2010

## Dear Chairman Jaczko:

I am writing in support of the South Texas Project Units 3 and 4 Combined License Application. This project will provide much needed energy generation capacity in the area and will have a significant positive impact for economic development in Matagorda County, which I represent as a Member of Congress for the 14<sup>th</sup> district of Texas. Please contact my office if there is anything we can do to assist you in this matter.

Thank you.

Sincerely,

Rep. Ron Paul, M.D. Member of Congress

VATSA KUMAR
Returned STP employer
5/6/2010

, gone down Since 1996

# Why nuclear power ??

Safety of plant personnel and plant equipment is number 1 priority. $\sim 5  \mathrm{Te}$
Trained personnel perform far more better than those that are not.
Emphasis on quality of work, multiple points of checks and balances. ${\it ad-Sip}$
Design reviews, updates and new designs in a timely manner a. STP Capacity factor Current 97.8.1, god 99.9.1.
1. Availability of advanced technology in the areas of plant design.

- 2. Large amount of power that is reliable and economical
- 3. Clean environment, no fly ash, no sulphur di oxide emission, no sludge removal, no need to store enormous quantities of fuel
- 4. No raw materials to be handled to or from the site in large volumes

Engineering continuously monitors the plant performance, looking for ways and means to continuously improve plant efficiency.

Cost of generation has gone down continuously due to improved plant performance, training of personnel and a positive attitude.

There are more deaths due to automobile accidents in our county than by any other method. Not a single death at the plant during my stay of 26 years.

What is the fear in supporting nuclear energy and the proposed units 3 and 4 ??

I Strongly urge NRC to issue the Construction and operating licences to STP.



April 30, 2010

Nuclear Regulatory Commission Office of New Reactors Washington, DC 20555-0001

Re: Support of Draft EIS for STP Units 3 and 4

1) Anale

Dear Sirs:

The Matagorda County Economic Development Corporation (MCEDC) fully supports the granting of a Combined Operating License for STP Units 3 and 4. Four reactors at the STP site were envisioned from the beginning. The site and cooling pond sizes were determined based on four reactors. The environmental impacts of constructing Units 3 and 4 will be minimal compared to construction of two new reactors on a new site.

The Matagorda County Economic Development Corporation submits this letter in support of the findings of the STP Draft Environmental Impact Statement that there are no significant environmental reasons for denying a Construction and Operating License for STP Units 3 and 4.

STP has proven it trustworthiness to the NRC and to Matagorda County by its safe and reliable operations since the mid-1980s. Its performance and safety records have set national and international standards. STP is a valued business in our community. Its employees are very active in all types of civic, religious, recreational and political spheres within the community. We expect an enlarged STP—with Units 3 and 4 added—will continue that same level of safe, reliable and dependable operations and community involvement.

The Matagorda County Economic Development Corporation urges the NRC to approve the Draft EIS and to proceed with the remainder of the review process in order to issue the Construction and Operating License in early 2012 for Units 3 and 4 to begin construction.

Sincerely,

Nate McDonald County Judge President



# CITY OF PALACIOS ECONOMIC DEVELOPMENT CORPORATION

420 Main Street • P.O. Box 877 • Palacios, Texas 77465-0877 Telephone 361-972-3729 Fax 361-972-5258

e-mail: copedc@wcnet.net

Website: http://www.palacios.org

May 5, 2010

Nuclear Regulatory Commission Office of New Reactors Washington, DC 20555-0001

Re: Support of Draft EIS for STP Units 3 and 4

Dear Sirs:

The City of Palacios Economic Development Corporation wishes to go on record as supporting the findings of the STP Draft Environmental Impact Statement that there will be no significant environmental reasons for denying a construction and operations permit for STP Units 3 and 4.

The STP site was planned for four reactors. The site cooling pond was sized for four reactors. The primary environmental impacts to the site occurred during the construction of units 1 and 2. Adding Units 3 and 4 will have minor environmental effects.

STP has proven it trustworthiness by its safe and reliable operations since the mid-1980s. Its performance and safety records have set national and international standards. STP is a valued business in our community. Its employees are very active in all types of civic, religious, recreational and political spheres within the community. We expect an enlarged STP—with Units 3 and 4 added—will continue that same level of safe, reliable and dependable operations and community involvement.

The City of Palacios Economic Development Corporation urges the NRC to approve the Draft EIS and to proceed with the remainder of the review process in order to issue the construction and operating license in early 2012 for Units 3 and 4 to begin construction.

Sincerely,

Ken Johnson President

# SOLID STATE POWER CONVERTER

#### BACKGROUND OF THE INVENTION

The present invention relates to a solid state power converter. In more detail, the present invention relates to a method and apparatus for converting the energy output by a radioactive source to electricity using the principals of quantum mechanics and kinetic energy.

Photoluminescence is a process in which a substance absorbs electromagnetic radiation and then radiates photons. Quantum mechanically, this can be described as an excitation to a higher energy state and then a return to a lower energy state accompanied by the emission of a photon.

Experimental French physicist Edmund Becquerel discovered the photovoltaic effect in 1839. French physicist Antoine Henri Becquerel discovered the existence of radioactive materials in 1896.

The first functioning nuclear reactor was the Clinton Laboratories in 1943 as part of the Manhattan Project. Later, the Clinton Laboratories were renamed Oak Ridge National Laboratory.

Currently, the main methods of creating electricity using the nuclear reactors developed as a result of the commercialization of that work utilize a Radioisotope Thermoelectric Generator (RTG), which uses a thermocouple, temperature differentials, and by steam generation from heating water due to radioactive decay to turn an electric generator. Such installations are expensive, and therefore necessarily large enough in scale as to produce sufficient electricity to justify the expense of building such power generation facilities and linking them to the power distribution grid.

There is also a need for decentralized power generation as shown by the many alternatives available commercially for power generation, including solar cells, generators, windmills, and other so-called alternative energy sources. It is an object of the present invention to provide such an alternative electrical power source.

Another object of the present invention is to provide a source of electrical power that utilizes materials that are considered the waste, or by-products, of nuclear power generation.

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Another object of the present invention is to provide a method of disposing of nuclear waste.

Another object of the present invention is to provide an electrical power generator that is in the nature of a power converter in the sense that potential energy from naturally-occurring or man-made radioactive materials are used as a source for producing electricity.

Other objects, and the many advantages of the present invention, will be made clear to those skilled in the art in the following detailed description of the preferred embodiment(s) of the invention and the drawing(s) appended hereto. Those skilled in the art will recognize, however, that the embodiment(s) of the present invention that are described herein are only examples of specific embodiment(s), set out for the purpose of describing the making and using of the present invention, and that the embodiment(s) shown and/or described herein are not the only embodiment(s) of method performed in accordance with the teachings of the present invention.

### SUMMARY OF THE INVENTION

The present invention meets the above-described objects by providing a solid state nuclear power converter using radiation from a radioactive source to bombard a photoluminescent material, causing the emission of photons from the material. Next, a photovoltaic cell in close proximity to the photoluminescent material absorbs the photons to produce electric current and voltage. The resultant electric power that is produced is direct current (DC) from the photovoltaic cell. A second effect occurs from decay of radioactive material from the vast amount of liberated neutrons that strike the photoluminescent material. These speeding neutrons possess a high kinetic energy and are suddenly stopped by the photoluminescent material, causing as burst of photons to be emitted that can be absorbed by the photovoltaic cell.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the figures, Fig. 1 is a partially schematic view of a presently preferred embodiment of the power converter of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring now to Fig. 1, a preferred embodiment of the power converter of the present invention is illustrated and will be described in detail. The power converter

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comprises a radioactive source 10, the photoluminescent material 12, and a photovoltaic cell 14. The radioactive source 10 can be any naturally-occurring or man-made radioactive material, including, for instance, the spent fuel rods of a nuclear reactor, the by-products of processes for enriching uranium or other nuclear fuel, high- or low-grade uranium ore, or any other material that produces enough radiation to cause the photoluminescent material to emit sufficient photons to be absorbed and converted to DC electricity by the photovoltaic cell at a rate that makes power conversion economically viable.

Certain materials will absorb electromagnetic radiation and/or kinetic energy from radioactive particle impacts and emission of photons characteristic and such materials are referred to herein as the photoluminescent material. The photoluminescent material that is suitable for use in the power converter of the present invention is any material that, after being struck by the by-products of atomic decay and/or electromagnetic radiation causes an atom or molecule to engage in the photoelectric effect and emit photons. Suitable materials include any material that luminesces, fluoresces, or phosphoresces, including zinc sulfide, strontium aluminate, and calcium fluoride.

After the photons are emitted by the photoluminescent material, the photons are absorbed by photovoltaic cell 14, completing the power conversion process. The photovoltaic cell 14 is any photovoltaic cell that is, for instance available commercially from any number of vendors and is sized so as to produce electricity at maximum efficiency from the photons produced by the photoluminescent material. Such cells are available from, for instance, Mitsubishi, Sharp, Kyocera Solar, BP Solar, and other known vendors.

In one embodiment, the photoluminescent material 12 is sandwiched between the radioactive source 10 and photovoltaic cell 14, but any arrangement in which photoluminescent material 12 is positioned in close enough proximity to radioactive material 10 that incident radiation from radioactive material 10 causes photoluminescent material 12 to emit photons and the photovoltaic cell 14 is positioned in close enough proximity to photoluminescent material 12 that incident photons produced by

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photoluminescent material 12 causes the photovoltaic cell 14 to produce electricity is contemplated by the apparatus of the present invention

In this manner, the low-level radioactive waste and/or spent fuel rods from, for instance, a nuclear power generator, can be utilized for generating electrical power in a system that needs little or no maintenance. The waste and/or fuel rods, rather than being an undesirable waste that is, for instance, stored in expensive, secure storage for long periods of time, is thereby allowed to emit radiation for long enough periods of time, while all the time it converts that energy to electrical power in accordance with the present invention, that the present invention effectively provides an economically-favorable method of disposing of nuclear waste.

To increase the power conversion efficiency of the power converter of the present invention, mirrors or mirrored surfaces are used to reflect photons created from the quantum effect of photoluminescent material 12 to increase the likelihood that said photons will strike the surface of photovoltaic cell 14 and be converted to electric voltage and current. Finally, the photoluminescent material itself can be a source of radioactive energy and radioactive particles by making the photoluminescent material itself radioactive due exposure to an alternate radioactive source or by the impregnation of radioactive material. In the event the photoluminescent material becomes radioactive or is impregnated with a radioactive source, as long as it does not have a major effect the efficiency of power conversion then the power converter can be used to consume the vast pool of radioactive waste material currently stored throughout the United States awaiting final disposal.

Three tests have been performed in accordance with the present invention. The first test used approximately 3.00 Krad/hr of Gamma radiation from a Lanthanum source and no electricity was detected from a solid state power converter constructed in accordance with the present invention comprised of a disc of photoluminescent material approximately 10 cm diameter positioned approximately three inches from the lanthanum source with the photovoltaic cell positioned approximately 1 mm from the photoluminescent material and wrapped in mirrored material to reflect photons. The second test used the same power converter and photovoltaic cell and a one megawatt reactor (30% U<sup>235</sup>) in a cold state that produced a large gamma flux with a small amount

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of neutrons at varying distances from the source (measured from the wall of the pool) as set out in Table 1, below, and the results are set out in Table 1. The third test used the same reactor and power converter in varying power levels from 1 Watt to 1 Megawatt (1 MW) and the results are set out in Table 2. Clearly the third test show that changing dosages of gamma radiation and of neutron flux produce measurable voltages of electricity. Power output from the solid state power converter changes in an almost direct relationship with increasing neutron flux (see Fission Detector Current Amps, Table 2, column 3). Additionally, the gamma radiation component is needed to slightly increase the output voltages from the disc (see Table 1). After examining Table 2 and at the end of the experiment, the power converter continued to output voltage.

<u>Table 1</u>: Measured distances and dosages from 1 MW Nuclear reactor in powered down state. Minimum results were detected.

Distance from West Pool Wall (in) (shutdown)	Gamma Doserate (Krad/hr)	Uncovered Converter with biased voltage (All voltages in millivolts)	Mirror Covered Converter (All voltages in millivolts)
99.6	2.05	No measurement changes	Same
87.6	2.03		
75.6	2.02		
63.6	2.01	•	
51.6	2.02		
39.6	2	•	
29.6	2.9	Data measurements started	
25.6	4	17.5	0.6
21.6	3.5	17.3	0.6
17.6	5.8	17.3	0.6
13.6	8.8	17.3	0.6
9.6	12.6	17.4	0.7
5.6	15.6	17.6	0.8
1.6	19.3	17.8	1.1

Table 2: Reactor operating at different power levels. 1 Watt to 1 MW

SS Power Level (linear/log)	Gamma Doserate (Krad/hr)	Fission Detector Current (amps)	Uncovered Converter with biased voltage (All voltages in millivolts)	Mirror Covered Converter (All voltages in millivolts)
critical (500mW, 200mW)	11.70	8.65*10^-9		
1W, 300mW	11.70	8.64*10^-9	17.3	0.9
10W, 2W	11.80	8.65*10^-9	17.5	0.9
100W, 150W	11.80	9.03*10^-9	17.2	0.9
1kW, 1.5kW	13.10	1.248*10^-8	17.2	1.0
5kW, 7kW	20.43	3.015*10^-8	17.6	1.3
10kW, 15kW	27.22	5.196*10^-8	18.0	1.7
20kW, 30kW	37.95	9.292*10^-8	18.9	2.7
40kW, 50kW	49.13	1.573*10^-7	20.0	3.8
75kW, 80kW	63.20	2.628*10^-7	22.0	6.0
100kW, 100kW	63.10	3.220*10^-7	23.1	7.4
150kW, 150kW	68.81	4.583*10^-7	25.5	9.8
200kW, 195kW	69.69	5.806*10^-7	27.7	11.9
250kW, 200kW	70.40	7.025*10^-7	30.0	14.6
300kW, 250kW	59.11	8.233*10^-7	31.5	16.2
350kW, 300kW	57.40	8.937*10^-7	32.5	17.1
400kW, 300kW	57.40	1.037*10^-6	34.3	19.0
450kW, 350kW	56.62	1.144*10^-6	35.4	20.2
500kW, 400kW	53.26	1.249*10^-6	36.6	21.6
550kW, 400kW	54.02	1.362*10^-6	37.7	22.6
600kW, 450kW	52.23	1.461*10^-6	39.2	24.1
750kW, 500kW	57.18	1.774*10^-6	42.6	28.0
1MW, 700kW	67.56	2.247*10^-6	49.7	34.0
250kW, 200kW	22.60	7.527*10^-7	28.4	14.5
100kW, 100kW	21.57	3.715*10^-7	21.6	8.3
Reactor	Powered	Off	15.2	2.2

Those skilled in the art who have the benefit of this disclosure will also recognize that certain changes can be made to the component parts of the power converter of the present invention without changing the manner in which those component parts function and/or interact to achieve their intended result. All such changes, and others that will be clear to those skilled in the art from this description of the preferred embodiment(s) of the invention, are intended to fall within the scope of the following, non-limiting claims.

## WHAT IS CLAIMED IS:

- 1. A solid state power converter comprising:
  - a radioactive source;
- a photoluminescent material positioned in close enough proximity to said radioactive source as to cause the emission of photons as a result of exposure to incident radiation; and
- a photovoltaic cell positioned in close enough proximity to said photoluminescent material that the photons emitted by said photoluminescent material cause the production of electricity.
- 2. The power converter of claim 1 wherein said photoluminescent material comprises zinc sulfide.
- 3. The power converter of claim 1 additionally comprising a mirrored surface for reflecting photons produced by the photoluminiscent material.

# ABSTRACT OF THE DISCLOSURE

A power converter for producing electricity from naturally-occurring or manmade radioactive sources. The radioactive source causes the emission of photons by a photoluminescent material and the photons emitted by the photoluminescent material cause a photovoltaic cell to produce electricity.