Bechtel, Ryan

From: Bechtel, Ryan
Sent: Wednesday, September 01, 2010 11:26 AM
To: Tappert, Karen
Subject: RE: NeuCon Submittal/FOIA Request

Karen,

Let's plan on a 45 min meeting starting at 2. Please ask him to have a copy of my thesis (electronic or hardcopy) and copy of the Chart of the Nuclides, for the discussion. We know he has the former, and ANY nuclear engineer should have copy of the latter easily accessible. If not the information is available online, it will just be more cumbersome for him to read through.

-Ryan

-----Original Message-----
From: Tappert, Karen
Sent: Wednesday, September 01, 2010 10:56 AM
To: Bechtel, Ryan
Subject: FW: NeuCon Submittal/FOIA Request

Hi Ryan,

I received the email below yesterday evening. John Augustine from NETL has requested just requested that you and I speak with Danese on a conference call and try to resolve this matter.

Are you available at all today?

Karen Tappert
Business Management Specialist
Office of Nuclear Energy, NE-42
US Department of Energy
Phone (301) 903-5905 Fax (301) 903-9480

-----Original Message-----
From: Larry Danese [mailto:danese@comcast.net]
Sent: Tuesday, August 31, 2010 9:42 PM
To: Augustine, John
Cc: Tappert, Karen; Lanauze, Angela
Subject: NeuCon Submittal/FOIA Request

Mr. Augustine -

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of moderation and reflection of those neutrons to accelerate the decay of the source material that generates the neutrons. This is the remarkable feature of the system.

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Thank you for your consideration.

Larry Danese

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From: Larry Danese <mailto:danese@comcast.net>
To: Tappert, Karen <mailto:Karen.Tappert@Nuclear.Energy.gov>
Cc: Lanauze, Angela <mailto:angela.lanauze@pr.netl.doe.gov> ; Dunlap, Ann <mailto:ann.dunlap@netl.doe.gov> ; Augustine, John <mailto:john.augustine@netl.doe.gov>
Sent: Tuesday, August 24, 2010 11:50 AM
Subject: Re: FOIA Request - NeuCon

Ms. Tappert –

Please accept my apology for the unavoidable delay in responding. Thank you for your email. We appreciate your assistance in providing information that assists us in understanding the reason(s) for the rejection of our USP.

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to capture many of the generated neutrons, and use them to accelerate the decay of those actinides that are part of the source material. It is this use that sets the USP apart from consideration of the sources themselves, and which we had hoped would be considered.

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NeuCon Technology greatly appreciates the timely way in which you and your office have addressed this issue. Thank you so much for your assistance.

Larry Danese

CFO

NeuCon Technology

770-458-0534

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From: Tappert, Karen <mailto:Karen.Tappert@Nuclear.Energy.gov>
To: Dunlap, Ann <mailto:ann.dunlap@netl.doe.gov> ; Augustine, John <mailto:john.augustine@netl.doe.gov> ; 'Danese@comcast.net'
Cc: Lanauze, Angela <mailto:angela.lanauze@pr.netl.doe.gov>
Sent: Wednesday, August 18, 2010 1:06 PM
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I hope this clears up any misunderstandings. Please confirm by return email if you need further information or wish to proceed with the FOIA request.

Thank you,

Karen Tappert

Business Management Specialist

Office of Nuclear Energy, NE-42

US Department of Energy

Phone (301) 903-5905 Fax (301) 903-9480

-----Original Message-----

From: Ann Dunlap [mailto:Ann.Dunlap@NETL.DOE.GOV]

Sent: Wednesday, August 18, 2010 11:19 AM

To: Tappert, Karen

Cc: Augustine, John

Subject: FOIA Request - NeuCon

Dear Ms. Tappert:

I am attaching a FOIA request that was sent to me for processing which I believe should have been sent to your office for response.

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Thanks.

Ann C. Dunlap

Paralegal Specialist

FOIA Officer

National Energy Technology Laboratory

U. S. Department of Energy

626 Cochrans Mill Road

P. O. Box 10940

M/S 922/M210

Pittsburgh, PA 15236

(412) 386-6167

(412) 386-5949 - fax

email: ann.dunlap@netl.doe.gov

Bechtel, Ryan

From: Bechtel, Ryan
Sent: Wednesday, September 01, 2010 10:59 AM
To: Tappert, Karen
Subject: RE: NeuCon Submittal/FOIA Request

I have like 48 microseconds I can spare between 2:30 and 3:00. Between now and 1:30 looks awful. What time are they proposing?

-----Original Message-----
From: Tappert, Karen
Sent: Wednesday, September 01, 2010 10:56 AM
To: Bechtel, Ryan
Subject: FW: NeuCon Submittal/FOIA Request

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Business Management Specialist

Office of Nuclear Energy, NE-42

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Pittsburgh, PA 15236

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email: ann.dunlap@netl.doe.gov

Bechtel, Ryan

From: Bechtel, Ryan
Sent: Monday, July 26, 2010 9:05 AM
To: Tappert, Karen
Subject: RE: Information request for Danese Abstract

Karen,

Understood, thank-you.

I am a little concerned about the potential FOIA request, further down in the email. DOE would likely come back with no responsive documents, because the basis for my rejection of the USP was based on my master's thesis. My thesis is in the public domain, and was not funded by DOE and is not under DOE's control. Should it become necessary (if all he really wants is a paper showing that a very similar study was completed), a copy of my thesis can be found at: http://etd.gatech.edu/theses/available/etd-08312006-144610/

Thanks,

Ryan

-----Original Message-----
From: Tappert, Karen
Sent: Friday, July 23, 2010 4:35 PM
To: Bechtel, Ryan
Subject: FW: Information request for Danese Abstract

Ryan,

I have spoken to Angela about our response and this should be the end of it.

Thank you for your forbearance.

Karen Tappert
Business Management Specialist
Office of Nuclear Energy, NE-42
US Department of Energy
Phone (301) 903-5905 Fax (301) 903-9480

-----Original Message-----
From: Angela Lanauze [mailto:Angela.Lanauze@PR.NETL.DOE.GOV]
Sent: Friday, July 23, 2010 4:03 PM
To: Tappert, Karen
Cc: Bechtel, Ryan
Subject: Information request for Danese Abstract

Hello Karen,

We have received a comment from Mr. Danese indicating that he could not find literature for his proposed R&D (his email is listed below). Would it be possible to give Mr. Danese Ryan Bechtel's contact information, so Mr. Danese could speak directly with him.

His Abstract was sent through the Unsolicited Proposal Program to you on 6/10/10 and forwarded for review by Ryan on 6/11/10.

The formal response (in email below) was sent on 7/15/10.

Thank you.

Angela

Angela Lanauze, PRC
DOE Unsolicited Proposals
angela.lanauze@netl.doe.gov <mailto:angela.lanauze@netl.doe.gov>

>>> "Larry Danese" <danese@comcast.net> 7/22/2010 3:58 PM >>>

Ms. Lanauze -

I know this is not the only thing that you are working on, but has there been any progress on this request for document citation(s)?

We have reviewed some 2300 documents on the OSTI Information Bridge and have been unable to find anything relevant to our proposal.

This is not a challenge to the denial of the unsolicited submittal, it is just that we have $11,000 invested in studying the method suggested by our proposal, and would like to abandon the effort in place if it has already been studied.

We would appreciate any help that the DOE could give on studies that were the basis of rejection of the proposal.

Would it be better to go through the Freedom of Information process? and if so, should that be addressed to Mr. Augustine?

Thank you for the help.

Larry Danese

----- Original Message -----
From: Larry Danese <mailto:danese@comcast.net>
To: Angela Lanauze <mailto:Angela.Lanauze@PR.NETL.DOE.GOV>
Cc: John Augustine <mailto:John.Augustine@NETL.DOE.GOV>
Sent: Thursday, July 15, 2010 5:19 PM
Subject: Re: Abstract Response

Ms. Lanauze -

We did rather extensive research in trying to find if this process had been tried before we considered it, but had not been able to locate any papers on the process we proposed.

Would it be possible for you, or perhaps Mr. Augustine, to provide citations for the research that has been done?

Thank you for the help.

Larry Danese

----- Original Message -----

From: Angela Lanauze <mailto:Angela.Lanauze@PR.NETL.DOE.GOV>
To: danese@comcast.net
Sent: Thursday, July 15, 2010 1:44 PM
Subject: Abstract Response

Dear Mr. Danese,

Your abstract entitled "Analysis and Evaluation of a Passive Actinide Burner" has been reviewed by technical personnel at the Department of Energy (DOE), National Energy Technology Laboratory (NETL), Office of Nuclear Energy, Science and Technology.

After review, it was concluded that your project has already been researched through the DOE. Analyses with the same tools on the same problem have been completed. Therefore, we cannot consider funding this project as an unsolicited proposal.

If you would like to identify future opportunity announcements and register to obtain grant e-mail notifications of those that may interest you, go to www.grants.gov <http://www.grants.gov/> . After clicking on 'Find Grant Opportunity,' you may apply for notifications under 'e-mail subscriptions'; then click on 'Notices Based on Advanced Criteria' to subscribe for specific areas that interest you. You will have to insert a Catalog of Federal Domestic Assistance (CFDA) number on this page. The General Services Administration provides access to the CFDA, which is a government-wide compendium of Federal programs, projects, services, and activities that provide assistance or benefits to the American public. The website contains financial and non-financial Federal assistance programs. The CFDA website is located at www.cfda.gov <http://www.cfda.gov/> ; under "Search" (right side of screen), click "Find Programs by Agency". The Dept. of Energy CFDA numbers can be located at:
https://cfda.symplicity.com/?s=agency&mode=form&tab=program&id=f9b483c381bd2a656b43cec368f9438f
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If you have further questions, please contact me.

John N. Augustine

DOE Unsolicited Proposal Manager

john.augustine@netl.doe.gov <mailto:john.augustine@netl.doe.gov>

Angela Lanauze, PRC
DOE Unsolicited Proposals
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Bechtel, Ryan

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To: Tappert, Karen
Subject: RE: Larry Danese Abstract

Karen,

In principle, this USP should go to the Fuel Cycle office for review as this is there area of research. However I have an extensive background using the codes described in this paper, and more to the point have already done an analysis with the same tools on the very same problem described in this paper during my first semester in grad school. So I am probably the best reviewer in NE for this USP. I have included my recommendation and hastily written review below.

In short, I do recommend NOT pursuing or funding this proposal. I recommendation is based on the following reasons:

1) The (a,n) neutron flux is too small to have an impact on the composition of the actinides. Reactor burners have fluxes 16+ orders of magnitude greater than isotopic systems. This means that few if any actinides will be activated to shorter lived isotopes. I did this analysis for my first master's degree (I can provide the thesis if needed), and the converted isotopes through (n,g) is very small; (n,f) is greater but not mentioned in the proposal (and that causes other regulatory issues)
2) The proposers should already know that the optimal ratio of (a,n) neutron generation is the 13:1 beryllide:actinide ratio. This is well established and does not need to be re-evaluated. So WBS-1 is not needed.
3) Making a homogenous mixture of beryllium and actinide (spent fuel) will be expensive, time consuming and highly technical, and I believe the process makes the waste a higher hazard category as neutrons and hard gammas are involved.
4) Optimizing a beryllium reflector shield (WBS-2) is fairly straight forward, and 1600 hrs is too extensive.
5) In WBS-3, the proposers wish to use origen-s code, which can actually do the same calculations required for their problem, listed in WBS-1 and 2, as was used in MCNP and Sources-4c (the latter of which has been integrated into origen). A 5 hour study using this code would prove my item 1.
6) Accelerator time would not be significantly cut using this proposal, see item 1.
7) A confirmatory test would cost much more than suggested here, and would take a long time. Plus new testing is not required. Old (a,n) sources could be cut open and examined to show that this method would not work.
8) The proposers would not be charged by RSICC for the computer codes, as they are on a DOE contract and therefore have access to the codes for free to perform this work. This of course only applies if we were to fund this study, which I recommend against.
9) The proposers list experience with working with the NRC and shipping regulations, but clearly do not know or mention extensive regulations that would be imposed on their product should it ever be built.

In conclusion, I don't think this should be funded. A firm literature review and back-of-the-envelope calculations should have been sufficient for the proposers to know that this is not viable or an effective means of eliminating long lived actinides.

-Ryan

-----Original Message-----
From: Tappert, Karen

Sent: Friday, June 11, 2010 10:16 AM
To: Bechtel, Ryan
Subject: FW: Larry Danese Abstract

Hi Ryan,

Attached is the most recent unsolicited proposal. If I'm not imposing on you, please review or let me know under whose purview this falls.

Hope you're not working too hard.

Thanks,

Karen Tappert

-----Original Message-----
From: Angela Lanauze [mailto:Angela.Lanauze@PR.NETL.DOE.GOV]
Sent: Thursday, June 10, 2010 4:15 PM
To: Tappert, Karen
Subject: Larry Danese Abstract

WITH THE INCREASED ACTIVITY OF FINANCIAL OPPORTUNITY ANNOUNCEMENTS (FOA'S) PUBLISHED AT THIS TIME, PLEASE ENSURE THAT THE REVIEWER DETERMINE ASAP IF THE PROPOSER'S TECHNOLOGY FITS UNDER THE SCOPE OF ANY CURRENT OR PENDING FOA'S UNDER THEIR COGNIZANT PROGRAM AREA SO THAT WE CAN NOTIFY THE SUBMITTER TO DETERMINE IF THEY WOULD CONSIDER APPLYING BEFORE THE CLOSING DATE....THANKS.

Karen...

The attached abstract was received by John Augustine, DOE Unsolicited Proposal Manager, NETL, Pgh., PA.

After a preliminary review by NETL technical personnel, it was determined that this abstract was best suited under your program area for review of programmatic interest.

NOTE: WHEN THE ABSTRACT IS FORWARDED ON FOR REVIEW, PLEASE NOTIFY THE DOE UNSOLICITED PROPOSAL OFFICE OF THE ASSIGNED PROGRAM REVIEWING OFFICIAL BY COMPLETING THE INFORMATION BELOW AND RETURNING TO OUR OFFICE VIA E-MAIL.

The subject abstract has been submitted for preliminary review to:

Name of Program Reviewing Official:

DOE Program Office Code:

Phone Number:

E-mail address:

This abstract is only a prelude to a full unsolicited proposal to determine if there is enough programmatic interest to warrant submission of a proposal and also to determine if the technology would fit under competitive announcements/solicitations within your program area.

Listed below are the three criteria requested in the abstract. If you determine that the abstract does not include sufficient information to conduct a preliminary review, please forward the abstract back to our office with any additional information to be requested so that we can notify the submitter to resubmit.

Abstract Sample Format: (3 different paragraphs)

1. What you propose to do and how (summary of at least 500 words.
2. Why it is beneficial to DOE.
3. How the technology meets DOE's mission (www.doe.gov/about/index.htm).

Review of this abstract is to be completed by 06/29/2010.

Please respond to John Augustine, DOE USP Manager at john.augustine@netl.doe.gov in order that we can draft a response and respond to the submitter to close out this action.

Thank you for your assistance.

Angela Lanauze, PRC
DOE Unsolicited Proposals
angela.lanauze@netl.doe.gov <mailto:angela.lanauze@netl.doe.gov>

Bechtel, Ryan

From: Tappert, Karen
Sent: Friday, July 23, 2010 4:35 PM
To: Bechtel, Ryan
Subject: FW: Information request for Danese Abstract

Ryan,

I have spoken to Angela about our response and this should be the end of it.

Thank you for your forbearance.

Karen Tappert
Business Management Specialist
Office of Nuclear Energy, NE-42
US Department of Energy
Phone (301) 903-5905 Fax (301) 903-9480

-----Original Message-----
From: Angela Lanauze [mailto:Angela.Lanauze@PR.NETL.DOE.GOV]
Sent: Friday, July 23, 2010 4:03 PM
To: Tappert, Karen
Cc: Bechtel, Ryan
Subject: Information request for Danese Abstract

Hello Karen,

We have received a comment from Mr. Danese indicating that he could not find literature for his proposed R&D (his email is listed below). Would it be possible to give Mr. Danese Ryan Bechtel's contact information, so Mr. Danese could speak directly with him.

His Abstract was sent through the Unsolicited Proposal Program to you on 6/10/10 and forwarded for review by Ryan on 6/11/10.

The formal response (in email below) was sent on 7/15/10.

Thank you.

Angela

Angela Lanauze, PRC
DOE Unsolicited Proposals
angela.lanauze@netl.doe.gov <mailto:angela.lanauze@netl.doe.gov>

>>> "Larry Danese" <danese@comcast.net> 7/22/2010 3:58 PM >>>

Ms. Lanauze -

I know this is not the only thing that you are working on, but has there been any progress on this request for document citation(s)?

We have reviewed some 2300 documents on the OSTI Information Bridge and have been unable to find anything relevant to our proposal.

This is not a challenge to the denial of the unsolicited submittal, it is just that we have $11,000 invested in studying the method suggested by our proposal, and would like to abandon the effort in place if it has already been studied.

We would appreciate any help that the DOE could give on studies that were the basis of rejection of the proposal.

Would it be better to go through the Freedom of Information process? and if so, should that be addressed to Mr. Augustine?

Thank you for the help.

Larry Danese

----- Original Message -----
From: Larry Danese <mailto:danese@comcast.net>
To: Angela Lanauze <mailto:Angela.Lanauze@PR.NETL.DOE.GOV>
Cc: John Augustine <mailto:John.Augustine@NETL.DOE.GOV>
Sent: Thursday, July 15, 2010 5:19 PM
Subject: Re: Abstract Response

Ms. Lanauze -

We did rather extensive research in trying to find if this process had been tried before we considered it, but had not been able to locate any papers on the process we proposed.

Would it be possible for you, or perhaps Mr. Augustine, to provide citations for the research that has been done?

Thank you for the help.

Larry Danese

> ----- Original Message -----
> From: Angela Lanauze <mailto:Angela.Lanauze@PR.NETL.DOE.GOV>
> To: danese@comcast.net
> Sent: Thursday, July 15, 2010 1:44 PM
> Subject: Abstract Response
>
> Dear Mr. Danese,
>
> Your abstract entitled "Analysis and Evaluation of a Passive Actinide Burner" has been reviewed by technical personnel at the Department of Energy (DOE), National Energy Technology Laboratory (NETL), Office of Nuclear Energy, Science and Technology.
>
> After review, it was concluded that your project has already been researched through the DOE. Analyses with the same tools on the same problem have been completed. Therefore, we cannot consider funding this project as an unsolicited proposal.
>
> If you would like to identify future opportunity announcements and register to obtain grant e-mail notifications of those that may interest you, go to www.grants.gov <http://www.grants.gov/> . After clicking on 'Find Grant Opportunity,' you may apply for notifications under 'e-mail subscriptions'; then click on 'Notices Based on Advanced

Criteria' to subscribe for specific areas that interest you. You will have to insert a Catalog of Federal Domestic Assistance (CFDA) number on this page. The General Services Administration provides access to the CFDA, which is a government-wide compendium of Federal programs, projects, services, and activities that provide assistance or benefits to the American public. The website contains financial and non-financial Federal assistance programs. The CFDA website is located at www.cfda.gov <http://www.cfda.gov/> ; under "Search" (right side of screen), click "Find Programs by Agency". The Dept. of Energy CFDA numbers can be located at:
https://cfda.symplicity.com/?s=agency&mode=form&tab=program&id=f9b483c381bd2a656b43cec368f9438f
<https://cfda.symplicity.com/?s=agency&mode=form&tab=program&id=f9b483c381bd2a656b43cec368f9438f> .

If you have further questions, please contact me.

John N. Augustine

DOE Unsolicited Proposal Manager

john.augustine@netl.doe.gov <mailto:john.augustine@netl.doe.gov>

Angela Lanauze, PRC
DOE Unsolicited Proposals
angela.lanauze@netl.doe.gov <mailto:angela.lanauze@netl.doe.gov>

Bechtel, Ryan

From: Tappert, Karen
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Subject: FW: Larry Danese Abstract
Attachments: Larry Danese Abstract.pdf

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Karen Tappert

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Thank you for your assistance.

Angela Lanauze, PRC
DOE Unsolicited Proposals
angela.lanauze@netl.doe.gov <mailto:angela.lanauze@netl.doe.gov>

NeuCon
Technology, LLC

P.O. Box 80653
Atlanta, Ga 30366

F. L. Danese
Member
CFO

J. S. Hobbs
Member

A. H. Wells
Member

Mr. John N. Augustine, Mail Stop 921-10
Unsolicited Proposal Coordinator
U. S. Department of Energy
National Energy Technology Laboratory
P.O. Box 10940
Pittsburgh, PA 15236-0940

May 17, 2010

Dear Mr. Augustine:

The NeuCon Technology Company herewith submits an Unsolicited Proposal for the Analysis and Evaluation of a Passive Actinide Burner. The proposal follows the format recommended by Document PDF-120KB.

The Passive Actinide Burner (PAB) is an innovative configuration of light metals, actinides, and neutron absorbers and reflectors that work to significantly reduce the effective half-life of actinides, compared to the natural rate of disintegration, by accelerating their decay. The reduction is achieved primarily by using the alpha emission of a decaying actinide to cause the production of a neutron. This neutron is then used to cause the further disintegration of another actinide. The process works because most of the neutrons generated are retained in the confined system to cause other disintegrations.

An evaluation of the PAB system is in the national interest because, if it is shown to be an efficient process, it will assist in addressing an important nuclear waste disposal issue. The accelerated destruction of actinides is needed because it is the long half-life of the actinides that causes the public concerns related to disposal container integrity over a long period of time, and the potential migration of dangerous materials to the surface via water transport. The PAB would alleviate those concerns by showing that the inventory of long-lived actinides could be markedly reduced by passive reaction within 10,000 years. This would help in establishing public confidence in the nuclear waste subsurface disposal program. Further, the 10,000-year time frame is within the theoretical window of time in which a disposal package is expected to retain its integrity, thereby ensuring isolation of this material until it is no longer a significant threat.

We offer this proposal because we believe that, should the system operate as anticipated, it would be a significant contribution to the future safe disposal of nuclear waste, helping to assure America's nuclear future.

We would be pleased to answer any questions that you may have.

Sincerely,

F. L. Danese

F. L. Danese,
NeuCon Technology
770-458-0534

(a) Our business information is as follows:

(1) Offeror's name and address:
NeuCon Technology, LLC
P.O. Box 80653
Atlanta, GA 30066
NeuCon Technology is a for profit small business.

(2) Names and telephone numbers of technical personnel to be contacted for evaluation or negotiation purposes are:
Larry Danese, 770-458-0534, Danese@comcast.net
Alan Wells, 770-262-6224, Ahwells@interserv.com

(3) Identification of proprietary data;
The proposal does not include the use of proprietary data.

(4) Names of other Federal State, or Local agencies or parties receiving the proposal or funding the proposed effort;
There are no agencies that are funding the proposed effort and no agency has received the proposal.

(5) Date of Submission;
May 17, 2010

(6) **Signature of a person authorized to represent and contractually obligate the offeror.**

F.L. Danese

F.L. Danese

(b) Technical information

(1) Title and abstract of the proposed effort:

Analysis and Optimization of a Passive Actinide Burner.

The proposal provides for the technical analysis and optimization of a configuration of actinide, light metal and neutron reflector and absorber materials that would result in the acceleration in the rate of decay of the actinides.

The technical analysis would use nuclear modeling and analysis to project the rate of decay, and the rate of heat generation from that decay, of actinides that are in close proximity to light metals (e.g. beryllium). The analysis would use bench marked computer codes common to the nuclear industry. The reaction investigated is the generation of neutrons within the light metal resulting from the alpha particle (natural) disintegration of the actinide, the slowing down (or thermalizing) of the neutrons within a moderating material with the subsequent use of the thermal neutrons to cause additional actinide decay.

The configuration of materials is intended to retain the generated neutrons within the system to cause the further disintegration of actinides. It is expected that the retention of the neutrons within the system will significantly increase the rate of decay of the actinides compared to the natural rate of decay. (Note: The term "actinide" is intended to include the range of heavy, long-lived radioactive materials, such as Americium, resulting from the production of energy by fissioning of uranium in power or research reactors.)

The increase in the rate of decay of the actinides occurs passively due to the configuration and nuclear physics of the system. It does not rely on energy input to the system.

(2) Objectives of the effort, the method of approach and extent of effort, the nature and extent of the anticipated results, and the manner in which the work will help to support accomplishment of the agency's mission;

The very long half-life of actinides is the principal concern in the national nuclear waste disposal program. The purpose of this analysis is to show that actinide decay can be accelerated by passive means so that the decay life of the actinides is "compressed" into the 10,000-year time frame in which there is some assurance of the integrity of disposal containers.

Objectives of the Proposal

The principal objective is to show that the natural rate of decay of actinides can be increased by capturing neutrons that are created within a mixture or alloy of actinides and a light metal, such as beryllium; and, using those captured neutrons to cause new transmutations or disintegrations of the actinides in the mixture or alloy. Transmuted, heavier actinides have radioactive decay half-lives of hundreds of years instead of hundreds of thousands of years. Increasing the rate of decay reduces the actinide inventory over a much shorter time, so that the radioactive waste isolation period is reduced from hundreds of thousands of years to approximately 10,000 years.

The approach is to use well documented and bench marked computer codes to model the anticipated actinide/light metal configuration. The computer modeling includes the known nuclear properties and the interactions of the materials. The analysis would also consider the rate of heat generation, which is an important consideration in disposal, the optimum ratio of actinide to light metal, neutron moderator parameters and placement, and the optimum reflector/confinement configuration.

The analysis is expected to show that actinide decay can be accelerated such that the actinide material is minimal at 10,000 years. Using this system, the effective reduction in half-life occurs without the addition of energy to the system from any external source.

Supplemental Analysis

Historically, actinides have been "burned" in operating reactors. This process accelerates the decay of actinides, but does so at high cost and at some operator risk.

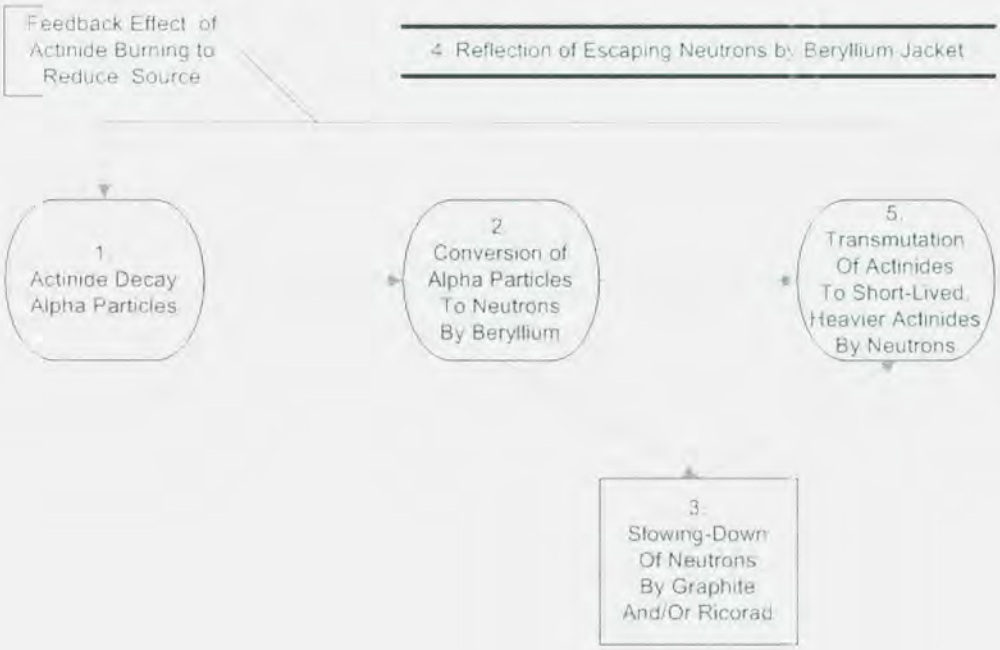
In a reactor burning actinides (instead of using standard burnable absorber rods), about 70 percent of the ^{241}Am is burned in the first cycle, 89 percent is burned in the second cycle,

and after three cycles, 98 percent has been burned. However, reactor operations make it difficult to burn actinides in multiple cycles, so burning 70 percent in a first cycle is reasonable. The PAB system is suggested for the remaining thirty percent. A combined actinide burning system that uses an operating power reactor for the first two-thirds of the actinides in one reactor cycle followed by permanent disposal of the remaining actinides in a PAB for 10,000 years can assure that the actinides are gone before the 10,000 year repository isolation period ends. Combined reactor boosted and PAB systems can be tailored to make optimum use of rapid (but expensive) burning followed by in-situ disposal burning to achieve the total burning needed to make a 10,000-year repository successful.

As part of this proposal, the use of combined systems will also be evaluated.

Proposed Work Breakdown Structure

The proposed WBS for this project focuses on completion of key tasks based on the physical processes taking place within a PAB canister, as illustrated in the figure below. Processes 1 and 2 form the basis of WBS-1, Optimization of the Neutron Source. Processes 3 and 4 form the basis of WBS-2, Optimization of Neutron Flux Distribution within PAB. Process 5 is the basis of WBS-3, Determination of Actinide Burning Ratio. WBS-4 investigates combining PAB Technology with operating reactor-based burning of actinides. WBS-5, Design of Confirmatory Test Program, provides a conceptual design of a Test Program to confirm that the calculated burning efficiency of a PAB is valid. WBS-6, Interim and Final Report Preparation and Meeting Presentation Support, will provide the end product of this study program. WBS-7, Quality Assurance, ensures that calculations, drawings, and reports follow established nuclear industry QA practices.



The work includes the analysis of two interdependent components. The first is the individual capsule or tube of actinide/light metal alloy, which is investigated to optimize size and the ratio of actinide to light metal. At this point, it is considered likely that a preferred physical configuration would be nearly identical to neutron source capsules that the Department of Energy routinely provides. The second component is the array of capsules and neutron absorbers and reflectors that are required for the system to work. A spaced array of capsules, separated by neutron moderator material is used to slow down, or thermalize, neutrons generated by the alpha particle in the light metal. It is these thermal neutrons that are used by the system to cause disintegration of other actinides. This interaction analysis is somewhat complex.

WBS –1 Optimization of the Neutron Source

Optimization of the neutron source occurs by adjustment of the Beryllium / Actinide mix ratio. Alloys of actinides and Beryllium are routinely formed to create laboratory neutron capsule sources but these are optimized to provide a neutron flux that radiates outward, while the PAB should be optimized to provide a source that will transmute (burn) the actinides. A higher Beryllium content provides a stronger source but also causes reflection of incoming neutrons from other sources in the waste package, so the optimum actinide / Beryllium ratio is different. The SOURCES4C computer code, developed by Los Alamos National Laboratory and provided through the DOE Radiation Safety Information Computational Center (RSICC), will be used in this work. (Estimate: 800 man-hours)

WBS-2 Optimization of Neutron Flux Distribution

The PAB is flooded with neutrons converted from alpha particles by the Beryllium. These neutrons are moderated (slow down or "thermalized") when they collide with the graphite and/or Ricorad™ as indicated by Process 3 in Figure 1. A Beryllium reflector jacket (cylinder) surrounds the components of the PAB to reflect and confine neutrons that would otherwise escape from the PAB. In order to optimize the effects of the thermalized neutrons, the best arrangement, thickness and density of the materials that reflect or absorb neutrons must be determined. The MCNP computer code developed by Los Alamos National Laboratory and provided through the DOE Radiation Safety Information Computational Center (RSICC), will be used in this work. (Estimate: 1200 man-hours)

WBS-3 Determination of the Actinide Burning Ratio

The actinide content, heat load, and alpha source of a PAB (for feedback to decrease the alpha source versus time as actinides are burned) are calculated as a function of time by the ORIGEN-S computer code. ORIGEN-S is a computer code that was developed by Oak Ridge National Laboratory and is distributed by RSICC. The calculation of actinide content and heat load versus time in a repository for a PAB is the end result of all of the calculations in this project. (Estimate: 400 man-hours)

WBS-4 Optional Accelerator or Operating Reactor Boosted PAB burning

The spent fuel from DOE high burnup demonstration programs contains considerably more actinide waste than the fuel currently being produced by commercial reactors. The fraction of actinide wastes that must be destroyed could increase by a factor of three for 60 GWd/MTU spent fuel versus the current common value of 45 GWd/MTU. To accomplish

this "extra" burning and still provide a 10,000-year isolation period in a repository, boosting the actinide burning process via neutrons produced by a particle accelerator is evaluated. Conceptual designs for accelerator burners described by Los Alamos and JAERI (Japan Atomic Energy Research Institute) will be considered in order to determine the best contributions from the accelerator and from the PAB. Similarly, LWR-boosting to achieve an initial burn will be evaluated. The optimum balance of accelerator or reactor burning versus PAB burning will be determined. (Estimate: 400 man-hours)

WBS-5 Design of Confirmatory Test Program
A Confirmatory Test Program will be designed (but not performed) in order to determine how best to validate computer calculations of actinide burning rates. This is expected to include a Neutron Flux Survey configured to use existing research neutron sources (e.g., at Georgia Tech or the University of South Carolina) to measure actual neutron distributions throughout a PAB. The efficiency of the PAB is strongly affected by our ability to accurately predict the neutron flux in each actinide capsule. Such testing could be performed on a prototype constructed using an existing DOE Standard Canister. An estimate of the costs to construct a prototype and perform the Neutron Flux Survey is the end product of this WBS task. (Estimate: 200 man-hours)

WBS-6 Interim and Final Report Preparation and Meeting Presentation Support
An interim report will be generated seven months after the start of the program, and will focus on the progress of each WBS task and identify any potential problem areas. A final report will be generated at the conclusion of the program to provide the results of the work in terms of the efficiency of actinide burning. Cost estimates for the future test prototype and for PAB systems suitable for disposal will be provided. The costs of production of the actinide capsules (DOE Standard Capsules) must be provided by DOE laboratories (e.g. ORNL) and will included if available. (Estimate: 400 man-hours)

WBS –7 Quality Assurance
All work performed in this WBS is subject to the Quality Assurance Program (QAP) of NeuCon Technology. All work packages, documentation, computer input/output, and drawings will be indexed and stored for three years or a contractually established period. (Estimate: 200 man-hours)

Follow on Proposal
Provided that the analysis described in this proposal is performed and shows that the PAB process is sufficiently efficient that accelerated destruction of actinides occurs, then a follow on proposal incorporating the results of WBS-5 (above) would be proposed. The follow on work would require the participation of a cooperating National Laboratory having an actinide inventory, light metal fabrication capability and the necessary process and radiation protection controls.

Supporting the Mission of the Department of Energy
This work supports the mission of the Department of Energy to encourage nuclear power development by addressing a critical nuclear waste disposal issue. The work intends to show that the effective radioactive life of actinides can be reduced to about 10,000-years.

It is the long half-life of the actinides that causes the public concerns related to container integrity and the potential migration of dangerous materials to the surface via water transport. The concept configuration would alleviate those concerns by showing that the inventory of long-lived actinides could be markedly reduced within 10,000 years. This would help in establishing public confidence in the nuclear waste subsurface disposal program. .

The proposed nuclear and thermal analysis is expected to require approximately 1.5 man-years. It is expected that part of the work would be awarded, or assigned to, the University of South Carolina, which already has a working relationship with the Oak Ridge National Laboratory. NeuCon Technology would oversee and manage any such out-sourced work to ensure cost control and work quality.

(3) Names and biographical information on the offeror's key personnel who would be involved;
The resumes of Mr. Larry Danese and Dr. Alan Wells are attached.

(4) Type of support needed from the agency:
The support needed from the Department of Energy for this proposal is funding. Any funds provided would be expended primarily for man-hour costs. Some funds would be used for computer modeling and programming support (to ensure the computer codes are current), for minor material and supply expenses, and for any travel for meetings that might be required by the Department of Energy in support of the proposal. In addition, it is likely that one or two persons could be hired part time to assist with report preparation, illustrations and other office tasks.

(c) Supporting information –

(1) Total estimated cost for the effort in sufficient detail for meaningful evaluation;
The estimated cost of performing the work is $360,000. As described above, this estimated cost provides for up to 3,000 man-hours at $105/hour, $5,000 for computer program upgrades and maintenance as necessary, with the remainder allocated to part time employees, quality assurance, reporting, overhead, meetings, travel and miscellaneous office supplies. It is not anticipated that any new computers, or other hardware, would be purchased. The agency would be billed actual costs, in accordance with a future contract. NeuCon Technology is anticipating that some portion of the work could be awarded to a University already having a working relationship with the Department of Energy.

(2) Period of time for which the proposal is valid;
Proposal is valid for 6 months from June 1, 2010.

(3) Type of contract preferred;
NeuCon Technology does not have a preferred contract type.

(4) Proposed duration of effort;

The proposed duration is 1.5-man years, with the work completed within 1 year of contract award.

(5) Brief description of the organization, previous experience, relevant past performance, and facilities to be used;

NeuCon Technology is a three-person consulting limited liability company formed in Atlanta, GA. Its three members have more than 100 years of combined experience in the nuclear industry, serving both commercial and government clients, and the company holds two nuclear waste related patents. The two members associated with this proposal have more than 70 years experience in designing nuclear waste transport and storage containers and both have worked at numerous Department of Energy facilities as contractors. Transport and storage containers require the thermal, criticality and shielding analysis that is envisioned for the work described here. NeuCon Technology has adequate workspace and workstation computers that have the capability to perform the required analysis and to maintain the Quality Assurance documentation. In addition, we have access to staff at the University of South Carolina and at Georgia Tech for technical support if necessary.

The proposed work would support a patented configuration of actinides and light metals that preliminary analysis shows has the potential to significantly shorten the decay time of long-lived isotopes as compared to the natural rate of decay of those same isotopes.

(6) Other statements, if applicable about organizational conflicts of interest, security clearances, and environmental impacts;

NeuCon Technology has no known organizational conflicts of interest. There are no environmental impacts of the proposed analysis. Security clearances are not required for work in accordance with this proposal.

(7) The names and telephone numbers of agency technical or other agency points of contact already contacted regarding the proposal.

There have been no other points of contact regarding this proposal.

Resumes for Larry Danese and Alan Wells

F. L. (Larry) DANESE

Experience Summary

Mr. Danese is a consultant, supporting clients in radioactive material package design, fabrication, storage and transport, since 1995. As a consultant, Mr. Danese has assisted clients primarily in the preparation of Safety Analysis Reports for Packaging (SARPs) submitted to the Nuclear Regulatory Commission (NRC) or to the Department of Energy (DOE). This work requires the incorporation of technical product developed by others, or original work, into a form and format that ensures compliance with Standard Review Plans, Regulatory Guides and other guidance. He has been an instructor for a DOE course in SARP preparation and for storage system technologies for the Chinese (Republic of China) Radwaste Administration. He has supported a number of spent fuel storage package license applications and the spent fuel storage program at Richland. He has provided technical support to the spent fuel transportation program at Oak Ridge National Laboratory.

Before working independently, he was with Science Applications International Corporation (SAIC), where he primarily supported the DOE Civilian Radioactive Waste Management System, but has also performed project specific tasks for various DOE offices. Prior to joining SAIC, Mr. Danese was Manager of Cask Operations for the Nuclear Assurance Corporation (NAC). He was Project Coordinator for the construction of the St. Lucie Plant for the Florida Power and Light Company. Mr. Danese has completed industry sponsored training in the 72.48 Determination process and DOE sponsored training in ISO-9000.

Specific Experience

As a consultant, Mr. Danese has worked primarily in the area of commercial reactor spent fuel and high-level waste transport and storage. He was responsible for ensuring that the Safety Analysis Reports for the NAC Universal transport and storage systems (UMS), the NAC MultiPurpose Canister System (NAC-MPC) incorporated staff prepared technical evaluations to show compliance with regulatory performance, content, format and other requirements. He has also assisted in the preparation of the SAR for the canister portion of the DOE MultiPurpose Canister (MPC) system. He prepared the contents and site description portions of the site SAR for the storage of spent PWR and BWR fuel in metal casks at the Hanford site. He is familiar with the application of ASME Section III Subsections NB and WB to canister fabrication and the application of the applicable sections of the Code to fuel baskets and other non-containment cask and canister components. Mr. Danese has extensive experience in the resolution of operational problems associated with dry cask storage, including vacuum drying, container handling, welding, testing and task sequence.

Mr. Danese has provided technical support to clients at Savannah River, Oak Ridge, Richland and Argonne West. These projects have primarily related to the packaging, storage or transport of high and low level waste with unique or singular characteristics.

While at SAIC, Mr. Danese primarily supported the U.S. DOE Civilian Radioactive Waste Management program. His work included the operational and technical review of spent fuel

transport and storage cask designs, and the development of the functional requirements for the CRWMS transportation and operations system. He had the lead in preparing preliminary service plans for the transport of spent fuel from each of more than 100 commercial reactors and DOE facilities. He also has evaluated derailment accident recovery practices for application to the recovery of spent fuel casks in rail accidents.

Mr. Danese provided technical support to the preparation of the draft Environmental Impact Statement for the shipment of foreign research reactor fuel to the US. He was the lead author for the sections of the EIS related to shipping cask, fuel and nonfuel bearing component descriptions, and for port identification and selection. He also provided technical support to the U. S. Defense Nuclear Agency for the design and production of containers for assembled and disassembled Russian nuclear weapons. He was a lead participant in a DOE program to remain abreast of commercial developments in dry storage of spent fuel and high-level waste. He has evaluated operations, and reported to the DOE on dry storage systems used at the Duke Power Oconee Station (NUHOMS), at the Virginia Power Surry Station (metal storage casks), the Consumers Power Co. Palisades Station (Sierra Nuclear VSC), and the Colorado Public Service Fort St. Vrain Station (Foster Wheeler System). He assisted ORNL in the preparation of The Radioactive Materials Packaging Handbook, authoring those chapters describing regulatory compliance for transport for Containment, Operations and Maintenance

Mr. Danese has also provided technical analysis and independent review for a number of package certification projects, including those for the DT-21 and DT-22 weapons component packages (certified by DOE and NRC) for Oak Ridge National Laboratory, and the 9971 package for the Savannah River Plant, among others. He has performed an independent review of the AT-400R fissile materials container, which was designed and evaluated against IAEA requirements and qualified by physical testing.

Mr. Danese joined SAIC from the Nuclear Assurance Corporation (NAC), where he was Manager of Cask Operations. In that capacity he had packaging and transportation responsibility for more than 400 spent fuel and high-level radioactive waste shipments, and had certification responsibility for 5 different models of spent fuel shipping casks. He was the Project Manager for the design of the NAC-LWT, a new legal weight truck spent fuel cask. This cask was certified in accordance with 10CFR71, and has received an IAEA Certificate. He has extensive on-site experience in cask handling at more than 35 commercial nuclear reactors, and at numerous DOE facilities, including Idaho Falls, Richland, Oak Ridge, Savannah River, and Albuquerque.

Prior to joining NAC, Mr. Danese was with Florida Power and Light Company. While with Florida Power and Light, Mr. Danese was responsible for the budgetary and schedule performance of the St. Lucie Backfit Project, which consisted of the planned improvements and required changes to the operating plant. He was also responsible for the preparation of the St. Lucie Unit 2 budget and for the coordination of the work performed under that budget. He also provided engineering support to the St. Lucie Unit 1 operating group during refueling outages, and assisted in the development of plans and schedules for backfit modifications to the Turkey Point Units 3 and 4.

ALAN H. WELLS, PhD

SUMMARY

- 40 years of nuclear power experience in a wide variety of engineering disciplines
- 15 years of waste disposal experience in the Yucca Mountain Project Waste Package Design Group and Board Member of the group that oversaw development of the analysis of the consequences of not building a repository (part of the Environmental Assessment)
- Experienced in the performance of criticality safety and shielding evaluations, structural evaluations (reactor vessels, shipping casks, cranes), thermal analyses (spent fuel), metallurgy issues (ultrasonic inspection, corrosion, welding), fuel design (PWR, B&W Mark 22I)
- Utility Experience (Plant start-up monitor calibration at Fermi-2, on-site fuel examination, rod consolidation)
- Medical Physics (patient radiotherapy) and Health Physics backgrounds (power plant dosimetry and access control software)
- Adjunct Professor of Computer Science Departments of Georgia Tech and Georgia State

EDUCATION

BS in Physics, Stevens Institute of Technology, Hoboken, NJ, 1970
MS in Computer Science,Texas A&M University, College Station, TX, 1975
PhD in Nuclear Enginering, Texas A&M University, College Station, TX, 1978

EXPERIENCE

Nuclear Engineering Consultant (1992-Present)

Dr. Wells is a nuclear engineering consultant specializing in the transportation, storage, and disposal of fissile and radioactive materials. He is currently developing a Topical Report for Burnup Credit for Commercial Spent Nuclear Fuel for the Electric Power Research Institute (EPRI) and is a member of the ANSI/ANS-8.27 committee for burnup credit standards. He recently completed an EPRI methodology report for Tennessee Valley Authority Multi-Purpose Canisters based upon burnup credit calculations for specific PWR assembly loadings and loading patterns.

Dr. Wells has just completed neutron and gamma detector layout calculations for the criticality accident alarm system (CAAS) at the USEC ACP centrifuge facility. This required developing new methods for calculations using the MCNP5 computer code to insure complete coverage of the Feed and Withdrawal, Shipping and Receiving, and Customer Service buildings.

Yucca Mountain Project (1991 – 2007)

Consultant for the Yucca Mountain Project for over fifteen years, involved in a wide range of issues including spent fuel characteristics and fuel failures, nuclear calculations, corrosion issues, structural issues, and thermal issues. Participated in waste package design and analysis and interdisciplinary meetings. Board Member for the No-Action Alternative Committee that oversaw development of the analysis of the consequences of not building the Yucca Mountain repository, as part of the Environmental Assessment.

B&W Space and Defense Systems (1990-1991)

Staff Nuclear Engineering Consultant (Advisory Engineer), responsible for solving problems encountered in the design of the New Production Reactor Heavy Water Reactor (NPR/HWR) for the Savannah River Site. Specific duties included guidance in the development of a version of MCNP that was used to compute tritium production rates in a new fuel design (Mark 22I) and neutronic calculations and thermal/hydraulic coupling during reactor transients. Dr. Wells chaired the Safety in Design review of the reactor design, and was manager of the metallurgy group as a secondary duty. He also served as the acting manager of the metallurgy group for the NPR/HWR program for the development of ultrasonic reactor vessel inspection. Dr. Wells was also involved in classified analyses for the Nuclear Thermal Rocket program.

Nuclear Assurance Corporation (1978 – 1990)

Chief Engineer and previously Manager of Licensing for NRC-certificated transport and storage cask systems. Dr. Wells used both MCNP and the SCALE KENO system for the analysis of commercial PWR and BWR spent fuel and a variety of uranium and plutonium spent fuel assembly types. Dr. Wells led cask development projects and is the inventor of four cask patents related to structural and thermal design. Dr. Wells was a member of the ANSI/ANS-8.21 Fixed Neutron Absorber criticality safety standard addressing new fuel storage vaults, spent fuel racks and casks.

Georgia Institute of Technology (1980-1982)

Adjunct Professor of Computer Science for the graduate program at Georgia Tech and undergraduate business program at Georgia State.

Los Alamos National Laboratory (1977-1978)

Research Fellow in the Theoretical Nuclear Data Group to develop a modified version of the MCNP computer code allowing the tracking of charged particles to allow the calibration of radiation detectors for cancer radiotherapy using fast neutrons.

U.S. Air Force (1970-1974)

Captain, Meteorology, working with classified satellite data including radiation monitors.