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Response to Request for Review for:

"Zilenghe 24MW Hydropower Project in Yunnan Province" (Ref. no. 2164)"

Dear Sir/Madam,

Please find below the response of the project participant (Carbon Asset Management Sweden AB) and the TÜV NORD JI/CDM Certification Program to the request for review for the above mentioned project no. 2164.

If you have any questions do not hesitate to contact us.

Yours sincerely,

TÜV NORD JI/CDM Certification Program

Rainer Winter

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Request for Review	
Issue 1	
Issue raised by EB Members / DNA	"1. The PP/DOE are requested to clarify whether expenses incurred before the restart of construction are in line with the requirements of EB 41, Annex 45 paragraph (7) guidance."
Response of project participant	As per EB 41, Annex 45 paragraph (7) guidance, in the case of project activities for which implementation ceases after the commencement and where implementation is recommenced due to consideration of the CDM the investment analysis should reflect the economic decision making context at point of the decision to recommence the project. According to the Damage Assessment Report[1] dated May 22nd, 2006 which is finished by the supervisory company, Hunan Chenzhou Yangguang Hydropower Supervising Consulting Co., Ltd who was qualified by Ministry of Water Resource of China and supervised the whole construction process as a third party, the actual expenses happened from the beginning on May 2nd, 2006 to the suspension on May 21st, 2006 are concluded as 0.7876 million RMB, which consist of 0.5712 million RMB used for the diversion tunnel project and 0.2164 million RMB used for auxiliary projects. Therefore the capital costs incurred prior to the restart date of the project have been identified as 0.7876 million RMB which is less than 1% of total investment of the project. But with taking into account of that the suspension time (from May 21st, 2006 to Aug. 25th, 2006) of the project is only 3 months (that is sufficient short to the whole construction period), the design institute, Chenzhou Water Conservancy and Survey Design Institute who is qualified by Ministry of Construction of China, considered that no significant change will happen to the recoverable value of the assets in months. Therefore the incurred expenses prior to recommencement of construction were directly included into the updated project costs in Design Change Report. For reasons of a) the suspension time is sufficient short to the whole construction period and b) the ratio of the incurred expenses to total investment is too small to impact on the investment decision of the project owner, the investment analysis in the PDD can be considered appropriate and reasonable. Furthermore, in order to show the financial situation of the project more clearly we would like to redo the investment analysis in the case of exclusion of the incurred expenses as follow[2]: **Step 1. Investment analysis** ***Sub-step 1a. Determine appropriate analysis method*** The benchmark analysis is chosen and the Internal Return Rate (IRR) is used to assess the financial viability of the project activity. ***Sub-step 1b – Option III. Apply benchmark analysis*** According to *Economic Evaluation Code for Small Hydropower Projects* issued by the Ministry of Water Resources (Document No. SL16-95), the benchmark IRR for small hydropower project is 10%. Therefore, 10% is adopted as the financial benchmark IRR for the Project. If the project IRR of the Project is less than 10%, the Project will be financially unfeasible and then be additional.

[1] See attached Annex 1-Damage Assessment Report, which has been provided to DOE for validation.
[2] See attached Annex 2-the Project IRR spreadsheet excluding incurred expenses.

Sub-step 1c. Calculation and comparison of financial indicators:

Basic parameters of the Project

The basic parameters to calculate the financial indicators of the Project are listed in Table 1.

Items	Unit	Data	Source
Installed capacity	MW	24	Feasibility Study Report
Estimated annual net electricity generated	GWh	98.73	Feasibility Study Report
Project lifetime	year	20	Feasibility Study Report
Total static investment	Million RMB	119.86	Design Change Report
Incurred expenses before restart	**Million RMB**	**0.7876**	**Damage Assessment Report**
Electricity tariff(incl. VAT)	RMB/kWh	0.18	Feasibility Study Report
VAT	%	6	Feasibility Study Report
Income tax (exempt for the first two years and halve for the later three years)	%	33	Feasibility Study Report
Tax of expense for city maintenance and construction	%	3	Feasibility Study Report
Tax of education fee addition	%	5	Feasibility Study Report
Annual O&M cost	Million RMB	3.4305	Design Change Report

Comparison of financial indicator

Based on these data listed on Table 1 above, the project IRR of the Project is only **7.07%** without the income from selling CERs. It is lower than the benchmark IRR of 10%. Therefore, the Project is not financially attractive and fulfils the requirement of additionality.

Taking into account of the income from selling CERs (calculated with the price of 10.5US$/tCO2e), the project IRR of the Project will be increased to 12.98%, which is higher than the benchmark return rate of 10%. The Project is economically attractive, which means that the CDM revenues could help the Project overcome the investment barrier.

[3] Based on the information from the Project owner, the actual total investment exceeds the estimated investment due to the increasing price of raw material and labour force. Meanwhile, the operation cost of the Project will also exceed the estimation. It is therefore conservative to assume that total investment and annual O&M cost vary in the range of ±10%. As for the project Income, it is calculated as the electricity generation multiplied by the tariff. The electricity generation is calculated by qualified Design Institute based on hydrological data of 40 years and in general will be very close to real situation in the long term. And the tariff was decreasing in the last 3 years according to an investigation report on local power market. Therefore, the range of ±10% can be considered reasonable for the sensitivity analysis of Project Income.

Sub-step 1d. Sensitivity analysis

The purpose of this step is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

	-10%	-5%	0	5%	10%
Project Income	5.80%	6.44%	7.07%	7.69%	8.31%
Total Investment	8.23%	7.62%	7.07%	6.56%	6.10%
Annual O&M cost	7.33%	7.20%	7.07%	6.94%	6.81%

Three factors are considered in following sensitivity analysis:

- ✧ Income
- ✧ Total investment.
- ✧ Annual O&M cost.

Assuming that the above three factors fluctuate within the range[13] of -10%~+10%, the corresponding impacts on the IRR of total investment of the Project are shown in Table 2 and Figure 1.

Table 2. IRR of total investment sensitivity analysis

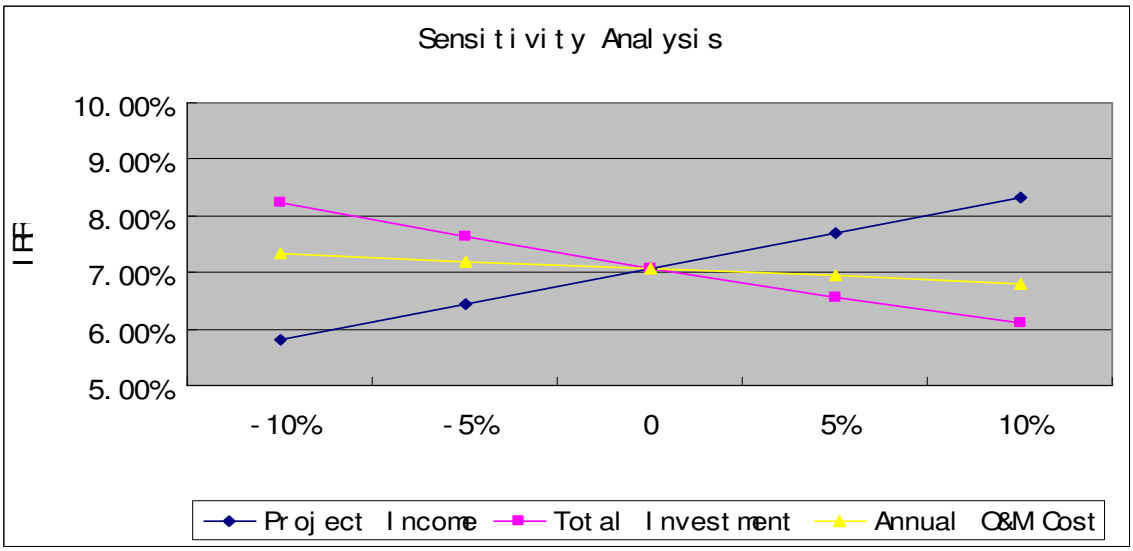

Figure 1. IRR of total investment sensitivity analysis

As shown in the sensitivity analysis above, even the fluctuation range of the factors reach ±10%, the project IRR of the Project could not reach the benchmark and the conclusion regarding that the Project is financially unattractive is still tenable.
In conclusion, the project activity is adequately proved additional and the investment analysis reflected the economic decision making context at point of the decision to recommence the project.

Response of DOE	The referenced EB guidance (EB 41, Annex 45, paragraph 7) requires the reflection of recoverable value of assets in the economic decision making context. The PP intents to meet the above mentioned requirement by issuance of a slightly revised investment calculation and provision of further evidences. In the course of reviewing all available documentation the following has been identified: • Recoverable value of assets, being the fair value of assets for which capital cost incurred prior to the revised project activity starting date are deducted from the total investment for this CDM project activity. • The investment incurred before recommencement of construction was 0.7876 million RMB of which 100% have been deducted from the total investment cost for the project activity. • According to Damage Assessment Report issued by Hunan Chenzhou Yangguang Hydropower Supervising Consulting Co., Ltd., investment prior to the revised project starting date comprises 0.5712 million RMB for tunnel construction and 0.2164 million RMB for auxiliary projects. • Since the deduction of 0.7876 million RMB represents the total investment prior to recommencement of the project implementation, even though only 0.2164 million RMB are recoverable, this calculation approach is conservative. • The suspension period due to the difficult geological situation was from May 21, 2006 to August 25, 2006. Potentially changes of recoverable values of assets in about 3 months are assessed to be insignificant. As a result of the revised investment calculation the financial parameters, i.e. the project IRRs (with and without consideration of sales of CERs) of the CDM project in question have slightly risen. The rise from 6.99% up to 7.07% without revenues from sales of CERs and with revenues from sales of CERs from 12.87% to 12.98% improves the project's financial viability slightly and does not violate the benchmark value of 10%. This situation remains even if input values "project income", "total investment" and "Annual O&M cost" fluctuate within the range of -10%~+10%. Thus the project was still economically unattractive at the point of decision to proceed with its implementation under the assumptions explained above and provided in the investment analysis. Hence, TÜV NORD concludes after a precise validation of the submitted documentation and background information that the requirement of EB 41, Annex 45 paragraph (7) guidance is fulfilled.
Issue 2	
Issue raised by EB Members / DNA	*"2. The DOE is requested to further clarify the suitability of the input values to the investment analysis as per the requirements of EB 38 paragraph 54(c) guidance, including, conservativeness of tariff applied, additional cost considered in the Design Change Report, net annual electricity supplied to the grid and residual value of assets."*
Response of project participant	The project owner would like to clarify the suitability of the input values to the investment analysis as per the requirements of EB 38 paragraph 54(c) guidance respectively as below: **(1) conservativeness of tariff applied** The tariff (0.18RMB/kWh incl. VAT) applied for investment analysis in PDD is sourced from the FSR of the project. But in January 2008, the project owner signed PPA[4] with the grid company in which the tariff including VAT is fixed as 0.16 RMB/kWh in wet season

(from May to October) and 0.20 RMB/kWh in dry season (from November to next April). It is known that for hydropower project the electricity generation in wet season is much lager than those in dry season. The weighted average of tariff in a whole year will no doubt be less than 0.18 RMB/kWh.

In order to demonstrate the real income situation of the project, the project owner provided the summery of actual net electricity export in 2008 for EB's reference.

Table 3. The Summery of Net electricity export of Zilenghe project in 2008[5]

2008	Dry season (Jan. to Apr. & Nov. to Dec.)	Wet season (May to Oct.)	Total
Net export (kWh)	34,238,160	58,509,660	92,747,820
Proportion in total export (%)	37	63	100

As shown in the table above, the actual weighted average of tariff of the project can be calculated as approximately 0.175 RMB/kWh, which clearly indicates that the tariff applied for investment analysis can be considered to be conservative.

(2) additional cost considered in the Design Change Report

In June 2006, the Design Change Report of the project is developed by Chenzhou Water Conservancy and Survey Design Institute who is qualified by Ministry of Construction of China. The Design Change Report has also been approved by local government on October 27th, 2006. According to the Design Change Report, the additional investment cost, estimated as 20.10 million RMB, are mainly used to strengthen the diversion tunnels as the geological condition of the diversion tunnels were found very unstable which results from highly weathered rock and serious ground water seepage. The total investment of the project is thus added to 119.86 million RMB with the additional cost.

The project owner is preparing the final account of expenditures and would like to provide actual financial data for DOE to check the suitability of the input values to the investment analysis. According to the final balance sheet[6] issued by Kunming Mingjiexin Real Estate Appraisal Co., Ltd, a qualified third party consultant, the actual total investment of the project on fixed asset is 125.54 million RMB which is actually 4.7% higher than estimated total investment in the Design Change Report.

(3) net annual electricity supplied to the grid

The net annual electricity supplied to the grid applied for investment analysis is quoted from the FSR (dated April 2006) which is the only available and reliable source for the project owner. The FSR of the project was developed by the design institute, Chenzhou Water Conservancy and Survey Design Institute who is qualified by Ministry of Construction of China. And the FSR has been approved by Development & Reform Committee of Nujiang Lisu Autonomous Prefecture on April 30th, 2006 (Document No: Nu Fa Gai Neng Yuan [2006]139).

According to the FSR of the project, the calculation of the net electricity supplied to the grid is stated as following:

Annual net electricity supplied to the grid = valid electricity amount * (1-Auxiliary power rate of plant)

In which,

1) The valid electricity amount of the project

The valid electricity amount of the project is calculated as per Economic Evaluation Code for Small Hydropower Projects (Document No. SL16-95) which is applicable to the proposed project and widely applied in the development of design documents. The Code SL16-95 shows the equation to calculate the valid electricity amount as following:

$$EL_{vali} = EL_{design} * Coeff$$

Where:
EL_{vali}: the valid electricity amount per annum;
EL_{design}**:** designed annual electricity generation, which indicates the maximum capacity of power generation without consideration of power limitation and is estimated to be 132,300 MWh for the project based on 40 years[7] hydrological data of Tangshang hydrological station.
Coeff: the coefficient of the valid electricity, the choice of the ***Coeff*** is indicated by Section 3.4 of the Code SL16-95 as follows:

Table 4. Coefficient of valid electricity from Code SL16-95[8]

The type of plants		Coefficient of the valid electricity
1	grid-connected power plants, regulating annual/several years;	0.95-1.00
2	grid-connected power plants, regulating seasonal;	0.90-0.95
3	grid-connected power plants, regulating monthly, weekly, daily and no regulating ;	
3.1	(when the grid takes all electricity generated in wet season and nighttime)	(0.80-0.90)
3.2	(when the grid takes part of the electricity generated in wet season and nighttime)	(0.70-0.80)
4	No connected to the grid, regulating daily and no regulating;	0.60-0.70

The proposed project is a grid-connected run-of-river hydropower project with no regulating capacity[9]. According to *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95), the proposed project belongs to category No.3 in the table 4. During validation phase, the DOE raised a clarification request of coefficient of the project, whereafter the Design Institute, Chenzhou Water Conservancy and Survey Design Institute who is qualified by Ministry of Construction of China, provided an explication to explain the selection of the coefficient on July 31st, 2008. The Design Institute stated that Nujiang Prefecture where the proposed project located is one of the least developed areas in China and has the per capita consumption of electricity of 532 kWh/yr. And in Nujiang Prefecture generation limit is kind of common feature because

	the electricity generation capacity exceeds the power demand. In particular, local nonferrous Metals Mining industry and metallurgy industry take the major part of electrical load. But in wet season the production activities of local mining and electroforming industry are restricted by inappropriate weather condition, which results in low electrical load and wide range generation limit. This situation can also be seen from the annual electrical load curve[10] based on historical data in Nujiang Prefecture. On the other hand, it is shown in the daily electrical load curve[11] that the average of the electricity load in nighttime (0.65) is significantly lower than the one (0.85) in other time, which indicates that electricity generation in nighttime will be further restricted by the grid. As is analyzed above, the Design Institute made the conclusion that part of the electricity generation of the proposed project will be limited by the grid in wet season and nighttime which implies that the proposed project belongs to subcategory 3.2 in the table 4. The intermediate value (0.75) of coefficient for subcategory 3.2 is thus chosen to perform the FSR, which is reasonable and suitable. 2) Auxiliary Power Rate of Plant According to statement in page 115 of the FSR of the project, the auxiliary power is mainly used for lighting power house, driving electric tools and control systems, etc. In general, the auxiliary power for small hydropower station is less than 1% of total power generation. The auxiliary power rate is thus selected as 0.5%, which is reasonable and conservative. Therefore, the net electricity supplied to the grid can be calculated as below: $$EL_{export}=EL_{vali}*(1-Rate_{auxi})=EL_{design}*Coeff*(1-Rate_{auxi})=132300MWh*0.75*(1-0.5\%)=98.73GWh$$ Furthermore, as per the summery of net electricity export of Zilenghe project in 2008 (please refer to Table 3 above) the actual total electricity supplied to the grid by the proposed project in 2008 is summarized as **92,747,810 kWh**, which is 94% of and close to the value used for investment analysis in the PDD. In conclusion, the applied value of net annual electricity supplied to the grid is suitable. **(4) residual value of assets** As per EB 41, Annex 45 paragraph (4) guidance, the fair value of any project activity assets at the end of the assessment period should be included as a cash inflow in the final year. The fair value should be calculated in accordance with local accounting regulations where available, or international best practice. Not to apply a residual value would imply that the project must repay the full value of the capital expenditure before the value of this expenditure had been consumed. According to the FSR and Design Change Report, the depreciation rate of the project is selected as 5% and the depreciation period is 20 years which is equal to the project lifetime. The residual value of assets is thus calculated as zero. At the end of assessment period the project has repaid the full value of the capital expenditures. Thus the residual value of assets applied for investment analysis can be considered suitable and consistent with EB guidance.

Response of DOE	The DOE was requested to clarify the suitability of the input values to the investment analysis as per the requirements of EB 38 paragraph 54(c) guidance, including, conservativeness of tariff applied, additional cost considered in the Design Change Report (DCR), net annual electricity supplied to the grid and residual value of assets. In respect of the second area indicated in the respective request for review the DOE would like to respond the following. The period of time between the finalization of the FSR / DCR and the investment decision is sufficiently short to confirm that material changes of input values are unlikely being occurred. This conclusion can be made after investigation of inter alia the FSR and other supporting documents, such as design change report, final balance sheet of Zilenghe project for final account and Power Purchase Agreement (PPA). **Electricity Tariff:** The electricity tariff has been defined both in the FSR and the DCR. As the final investment decision has been made on the basis of the Design Change Report TÜV NORD has checked the tariff and issuance date of the latter mentioned document in order to assess the validity of the value at the point of investment decision. Additionally, the Power Purchase Agreement (PPA) has been checked with focus on the issuance date and the agreed and documented electricity tariff. The electricity tariff applied in investment analysis (0.18 RMB/kWh) is in line with the tariff set out in the FSR. Subsequently, the DCR was issued in June 2006 and the tariff granted for generated electricity has been specified for the wet season and the dry season. The same specification has been agreed in the PPA signed on Jan 01, 2008. As per PPA and DCR the electricity tariff was regulated as 0.16 RMB/kWh in wet season (from May to October) and 0.20 RMB/kWh in dry season (from November to April in the next year). It could be determined that the average tariff will not exceed 0.20 RMB/kWh. Based on the verified electricity statistic provided by PP it is confirmed that the actual average tariff in 2008 was 0.175 RMB/kWh. In conclusion, the electricity tariff of 0.18 RMB/kWh applied in investment analysis at the time of investment decision is assessed to be credible and reasonable. **Additional cost considered in the Design Change Report** The appropriateness of additional investments, necessary to reinforce the tunnel construction as well as the applicability of values at the time of investment decision has been reviewed and is verified herewith. The additional investment needed to strengthen the diversion tunnels amounts to 119.86 million RMB as per the Design Change Report (DCR). This conclusion is based on a precise verification of the DCR provided for validation by the PP and an assessment of the compiling organization of this report, the qualified water conservancy design institute. Moreover, Nujiang prefecture Development and Reform committee, i.e. the local government reviewed and approved this report. Therefore it is determined that this document is reliable and compiled in an accurate manner. However, due to current circumstances the actual total investment has even risen from 119.86 million RMB as per the DCR up to 125.54 million RMB according to the assessment result of total investment issued by Kunming Mingjiexin Real Estate Appraisal Co., Ltd., an independent professional real estate consulting company. Therefore, TÜV NORD would like to conclude that additional estimated costs considered in the Design Change Report are conservative and credible.

Net annual electricity supplied to the grid:

In order to determine the appropriateness of the parameter "net electricity supplied to the grid" the following validation steps has been followed.

The approach taken in calculating net electricity has been reviewed in sufficient detail and relevant parameters and assumptions have been counterchecked with supporting documents provided by the client for validation. Moreover, document's reliability and institutions independence was verified on the basis of TÜV NORD's local expertise in the course of validation. Hence, key parameters relevant for computing the estimated net electricity supplied to the grid can be summarized as followed.

The estimated annual net electricity supplied to the grid in accordance with the FSR is *98.73GWh*. Apart from the fact that the estimated annual net electricity generation has been reviewed and approved by the Nujiang prefecture Development and Reform committee we would like to annotate that the basis for this amount of estimated electricity builds a scientific survey aimed at collecting sufficient hydrological data over a 40 years period in order to achieve reliable results concerning water occurrence in the region in question. On the basis of the survey results the annual estimated electricity production (valid electricity) is determined to be *132,300MWh*. Multiplying the annual electricity production by a coefficient (0.75%) as well as the project's auxiliary electricity consumption (0.5%) the net exported electricity to the grid was calculated. The above mentioned coefficient must be in compliance with *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95) and was selected taking into account grid capacity limits in the rain season and nighttimes. The document No. SL16-95 officially issued by the governmental Ministry of Water Resources is determined reliable and applicable. Additionally, applicability conditions, particular w.r.t grid capacity constraints, has been verified and assessed to be reasonable.

Furthermore, the estimated auxiliary power rate, i.e. 0.5% can be determined reasonable. This percentage has been taken from the FSR, too and deemed to be within a permissible limit considering the energy consumers on site, such as lighting, driving electric tools and control systems.

Focusing on the demonstration of conservativeness of values applied for calculating the financial parameter the PP has provided monthly electricity confirmation sheets issued by the grid company. According to these documents the actual electricity supplied to the grid in 2008 was *92,747,810 kWh*. It can be seen that the actual electricity generation is less than the estimated annual electricity generation, even though this value has less validity since the year 2008 represents just a point in time compared to the 40 years survey.

TÜV NORD would like to conclude that the applied value of net annual electricity supplied to the grid is justified and defendable taking into account the above mentioned explanation and supporting documents provided for validation.

Residual value of assets:

Generally residual values of assets are reflected in investment calculations as cash inflow in the final year of the project activity's lifetime. This is in fact also expressed in EB 41 Report, Annex 45, paragraph 4. Whether or not residual values of the assets are considered in the investment calculation is depending on national / international accounting standards. Moreover, the project lifetime is determining the residual value. In the specific case of the project in question the depreciation period is 20 years which is equal to the project lifetime. The national accounting regulation, i.e. Accounting Criteria

	for Enterprises, issued by Ministry of Finance of China requires to fix the depreciation rate for this specific investment by 5% over the entire project lifetime. The 5% value has been correctly utilized to calculate the project's depreciation rate in the investment calculation and is documented in FSR and DCR. Therefore, all the capital expenditure will be depreciated over the project lifetime and no residual value was expected to remain at the point of investment decision. Additionally, the project lifetime was proofed by the equipment purchasing agreement which is deemed to be a reliable source in order to assess the lifetime of the project components. Any changes of these key assumptions are not observed until now and its validity is ensured by TÜV NORD herewith. In conclusion, the residual value of assets applied for investment analysis is assessed to be reasonable.

[4] See attached Annex 3-The PPA of the project, which has been provided to DOE for validation.

[5] See attached Annex 4-The scanned copy of Electricity sales receipts of the project in 2008.

[6] See attached Annex 5-Final balance sheet of Zilenghe project.

[7] Period from April 1960 to December 1999, sourced from page 36 of the FSR.

[8] See attached Annex 6- Economic Evaluation Code for Small Hydropower Projects (SL16-95), issued by the Ministry of Water Resources.

[9] Source: FSR of the project, page 65.

[10] See attached Annex 7- the Explication for Coefficient applied for Zilenghe project from Design Institute, which has been provided to DOE for validation.

[11] See attached Annex 6- the Explication for Coefficient applied for Zilenghe project from Design Institute, which has been provided to DOE for validation.