GEF/UNDP project Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam Terminal Evaluation Report



Carlo Lupi and Nghiem Kim Hoa-

Independent Consultants

Terminal

Evaluation

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Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam

GEF Project ID: 3032 UNDP PMIS ID: 3685

Terminal Evaluation Report - November 2014 / January 2015

Carlo Lupi Nghiem Kim Hoa

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2. EXECUTIVE SUMMARY

2.1.PROJECT SUMMARY TABLE

GEF Project ID	3032
UNDP PMIS ID	3685
Funding Source	GEF Trust Fund
Project Name	Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam
Country	Vietnam
Region	Asia and the Pacific
Focal Area	POPs
Operational Program	14
Strategic Program	CB-1
PIF Approval Date	13/12/2007
Approval Date	22/02/2008
CEO Endorsement Date	15/09/2009
Project Status	IA Approved
Executing Agency	UNDP
Description	Several extensive and highly contaminated dioxin hotspots exist in Viet Nam. Several barriers (management, technical capacity, unavailability of data, institutional capacity, financial resources, communication and education) have limited Viet Nam in its ability to deal with these hotspots. Without the project, dioxins accumulated at hotspots will continue to become bio-available and dispersed in the local and global environment, through soil particles and organic materials that bind dioxin and are carried by water currents, wild life, and air. The project will address the barriers described above in order to effectively contain/remediate the highly dioxin contaminated material in the three main hotspots areas at Phu Cat, Bien Hoa and Da Nang as well as address the technical, institutional, financial as well as societal root causes for enabling Viet Nam to address additional sites of concern.
PDF B Amount	25,000 USD
Project Cost	37,312,500 USD
GEF Agency Fees	450,000 USD
GEF Project (CEO Endo.)	4,977,000 USD
Co-financing Total (CEO Endo.)	32,335,550 USD
Project Cost (CEO Endo.)	37,312,550 USD
GEF Agency Fees (CEO Endo.)	450,000 USD

2.2.BRIEF INTRODUCTION TO THE PROJECT

The TCDD contamination in Viet Nam originated from the operations carried out by the US army during the armed conflict lasted from 1961 to 1971. The so-called Operation "Ranch-Hand" (May 1964 – January 1971) involved spraying an estimated 20 million U.S. gallons (76,000 m³) of defoliants and herbicides over rural areas of South Vietnam in an attempt to deprive the Viet Cong of food and vegetation cover. As the pesticides used for the Ranch Hand operation (and more specifically the so-called "Agent Orange") were contaminated by TCDD, the operation resulted in an extensive contamination by TCDD of large part of the country. 40 years later, whilst the TCDD level in the sprayed area declined to lower levels, high level of contamination remained in a number of "hot spots", among which the most severely contaminated are the three air bases where the Ranch Hand operation was based: the Bien Hoa Airbase, the Phu Cat Airbase, and the Da Nang Airbase.

As reported in the Project Document, the situation of TCDD contamination in the three air bases is as following:

- In the At Bien Hoa Airbase, there are at least three areas of very high contamination. The main area, a loading area (aka "Z1 area" see Annex 1), has dioxin concentrations in the soil surface (0-30 cm layer) as high as 409,818ppt I-TEQ and an estimated average of over 15,864 ppt I-TEQ, with elevated dioxin concentrations found down to at least 1.5m depth; following the estimates provided by the inception report, the total amount of soil requiring decontamination / containment is from 195,500 to 235,000 m3, out of which still requiring containment from 101,500 to 141,500.
- In the Da Nang Airport and Airbase, there are three geographically proximate areas of very high contamination. This includes the former "mixing and loading areas", where maximum dioxin levels reach 365,000ppt I-TEQ and the estimated average is well over 50,000ppt I-TEQ. The nearby storage/dumping area has a highest dioxin level of 134,802ppt I-TEQ with the average estimated as 39,883ppt I-TEQ.
- In the Phu Cat Airport and Airbase, dioxin concentration in the former herbicide storage area is very high, reaching up to 238,000ppt I-TEQ, and the average toxicity is estimated at 26,248ppt I-TEQ (over 97% of which is TCDD). The topography of the site suggests that water flow could have resulted in contamination of three nearby lakes, but samples taken from the drainage canal and lake sediment revealed comparatively low dioxin concentrations. The amount of soil to be contained, as revised at inception report, was of 12,000 m³
- The situation of PCDD/F contamination was updated with new monitoring data in the course of project implementation. The updated situation has been reported in the "Updated comprehensive report", released in 2014 (1)

The Project "Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam" (2) as originally approved has the objective to remove the barriers that limit Vietnam in dealing with the hotspot contaminated by Dioxin, namely:

- a) The lack of an overall plan to deal with the hotspots and an overall regulatory framework regarding dioxin contamination;
- b) Limited availability of high quality data on site contamination and effects on environments and people;
- c) Technological capacities (access to technologies and essential equipment, knowledge, experience) for problem analysis and for remediation of dioxin contamination;
- d) Institutional capacities for coordination of national and international partners, and for planning and managing site remediation;
- e) Financial resources for remediation to internationally accepted norms;
- f) Capacities for public education and local land use planning to address the sensitive issue of highly toxic materials near populated areas.

The following assessments of dioxin contamination in the three areas were made prior to the project submission to GEF by the Vietnamese government, UNDP and donors:

- The Z1 (Bien Hoa airbase, 1994/1995), Z2 (Da Nang airbase, 1997/1998) and Z3 (Phu Cat airbase, 1999/2002) project by the Vietnamese Ministry of Defence;
- The collaboration between US EPA and VAST (Viet Nam Academy for Science and Technology) on sampling and contamination analysis;
- The project "Assessment of Dioxin Contamination in the Environment and Human population in the vicinity of the Da Nang airbase, 2006/2007" by Office 33 and Hatfield Consultants Limited (Vancouver, Canada), with funding from Ford Foundation;
- Soil and sediment samples taken and analyzed under the UNDP preparation project, by the Viet Nam Russia Tropical Centre (VRTC) under the MOD and Hatfield Consultants.

The project built upon work conducted by international organizations or their contracted consultants in association with national partners, all of which are coordinated by the Office 33 of the Ministry of Natural Resources & Environment, which at the same time is the project implementation counterpart.

The project envisages the achievement of 3 outcomes:

- Outcome 1: Dioxin in core hotspot areas contained and remediated;
- Outcome 2: Land use on and around hotspots eliminates risks and contributes to environmental recovery;
- Outcome 3: Strengthened national regulations and institutional capacities.

2.3. EVALUATION RATING TABLE

The evaluating table below includes the additional outcomes achieved after mid-term evaluation and the updated scoring. Changes or new achievements after mid-term are reported in bold in Table 6 (Rating of the Relevance, Efficiency and Effectiveness of Project Outcome and Outputs.). Based on the available data and information, the "Satisfactory" scoring proposed at mid-term evaluation can be confirmed.

Evaluation Ratings:			
1. Monitoring and Evaluation	rating	2. IA& EA Execution	rating
M&E design at entry	HS	Quality of UNDP Implementation	S
M&E Plan Implementation	S	Quality of Execution - Executing Agency	S
Overall quality of M&E	S	Overall quality of Implementation / Execution	S
3. Assessment of Outcomes	rating	4. Sustainability (Risk)	rating
Relevance	HS	Financial resources:	М
Effectiveness	S	Socio-political:	L
Efficiency	S	Institutional framework and governance:	L
Overall Project Outcome Rating	S	Environmental :	М

Table 1: Project overall rating

	Overall risk for sustainability:	M/L
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2.3.1. Summary of achievements.

Component 1: Dioxin in core hotspot areas contained and remediated.

Indicator for Component 1: Volume of contaminated soil and sediment contained and remediated. As a result of the GEF-project and leveraged funds / activities, all contaminated soil at concentrations greater than 1,000ppt and sediment at concentrations greater than 150ppt will have been treated adequately and residual contamination safely land-filled, and thereby 1,736 g I-TEQ dioxin release will be avoided: at Bien Hoa by the end of 2010; at Da Nang by the end of 2012; and at Phu Cat by the end of 2011.

This very ambitious indicator was partially revised at project inception as following: "As a base target, an overall level of 1,700 g I-TEQ is recommended as a containment/remediation target such that this amount is eliminated as a near term ecological health threat and the amount actually eliminated (destroyed) be 1,000 g I-TEQ, all at Da Nang."

Achievements for component 1. At midterm, the containment at Bien Hoa was partially completed; highly contaminated PCDD/F soil was disposed in a safe landfill for temporary containment; in Da Nang a turnkey remediation project based on thermal desorption is being carried out by USAID. In Phu Cat, 7500 m3 of PCDD/F contaminated soil where stored in a safe landfill. The level of contamination of the soil inside the landfill was from 600 ppt to around 250000 ppt.

In Bien Hoa, the infrastructures built with project funds (interim measures for runoff containment) concerned around 102000 m3 of soil with a contamination ranging from 1700 to around 2780 ppt, with a peak value of 962500 pptTe. It may be estimated that an amount of PCDD/F ranging from a minimum of 610 g I-TEq to a maximum of around 4000 g I-TEq have been contained by the interim measures in Bien Hoa and Phu Cat, although no information on the containment effectiveness in Bien Hoa is available. The amount of PCDD/F destroyed in Da Nang cannot be quantified yet as the remediation is still ongoing and data are not available yet. The exposure to PCDD/F was reduced for around 120,000 persons living nearby the Bien Hoa airbase and 47,000 living in the surrounding of the Phu Cat airbase.

Component 2. Land use on and around hotspots eliminates risks and contributes to environmental recovery

Indicator for component 2. Existence of action plan for each hotspot. By the end of the project, appropriate land uses have been introduced for at least 10ha at Bien Hoa; 8 ha at Da Nang, and 4ha at Phu Cat

Achievement for component 2. This outcome (outputs 2.1 and 2.2) has been partially achieved as the overall responsibility of the management of military areas falls under the MOD. Office 33 and MONRE had limited power to decide on land use of the three sites. After mid-term, two workshops (One in Hanoi on July 2014 and one in Bien Hoa in Oct. 2014) on land use of the contaminated sites was held with the purpose to share views on the issue. After implementing containment infrastructures in Bien Hoa and Phu Cat, these were handed over to MOD, which is now coordinating the Environmental Assessment for Bien Hoa. Da Nang was handed over to MOD at the beginning of the project as the remediation activity for that site was implemented by USAID under MOD coordination.

Component 3. National regulations and institutional capacities strengthened

Indicator for component 3: Assessment of capacity among government officials: By the end of the project, at least 70% of officials have received training or awareness raising on dioxin and less than 5% of officials are unable to access information on policies and laws related to dioxin Assessment of capacity among local

communities. By the end of the project, less than 15% of respondents are unable to name agencies responsible for management of contaminated areas

Achievements for component 3. Standard on PCDD/F contaminated soil were implemented. Standard threshold for Industrial emission are under approval. A substantial number of trainings for officials and various stakeholder was carried out (see Annex I). At the baseline, 44% of local people in or near areas affected by dioxin do not know any agency undertaking treatment activities in the hotspots or surrounding area. For local awareness raising, the achievement is limited as by the end of the project, a survey in three communes reported 66.4% of residents in BH area 1 knowing about the communication activity of the project in general and 57.5% of residents in the surveyed area could name agencies responsible for management of contaminated areas.

3. SUMMARY OF CONCLUSIONS, RECOMMENDATIONS AND LESSONS

3.1.PCDD/F DESTROYED OR CONTAINED:

PCDD/F destruction targets and indicators. In the original project document, it was established as a target for component 1 that "As a result of the GEF-project and leveraged funds / activities, all contaminated soil at concentrations greater than 1,000ppt and sediment at concentrations greater than 150ppt will have been treated adequately and residual contamination safely land-filled, and thereby 1,736 g I-TEQ dioxin release will be avoided: at Bien Hoa by the end of 2010; at Da Nang by the end of 2012; and at Phu Cat by the end of 2011."

At inception report, however this target was modified as following: "As a base target, an overall level of 1,700 g I-TEQ is recommended as a containment/remediation target such that this amount is eliminated as a near term ecological health threat and the amount actually eliminated (destroyed) be 1,000 g I-TEQ, all at Da Nang."

Based on this refined target, it is understood that out of the 1,700 g I-TEQ to be destroyed or contained, a target of 1,000 g I-TEQ need to be actually eliminated by the ISTD destruction technology implemented in Da Nang, and the remaining 700 g I-TEq would be either destroyed or contained in Bien Hoa and Phu Cat

Achievement. The project was successful in building infrastructures for containing the release of PCDD/F from two hotspots (Phu Cat and Bien Hoa) to the environment, by means of the following actions:

- 1. Construction of an hydraulic barrier to prevent transport of PCDD/F contaminated soil and sediment by surface runoff following heavy rains events in Bien Hoa (completed in February Feb 2014 after project mid-term evaluation)
- 2. Establishment of a safe landfills containing around 7500 m³) of highly PCDD/F contaminated soil excavated from contaminated areas of the Phu Cat air bof Pase (completed in 2012, before project mid-term evaluation);

The activities in Da Nang, implemented by USAID, was since the second year of project implementation, being undertaken independently with USAID and MOD resources under a bilateral US-Vietnam cooperation, mostly under the coordination of MOD. In Danang a large amount of PCDD/F contaminated soil by means of on site thermal destruction is being remediating.

Except for one report (3) containing preliminary estimates based on data pertaining to the undisclosed Hatfield- USAID database, there were no attempts to monitor or assess the effectiveness of containment or destruction activities.

Under the evaluation, a simple formula to assess the potential amount of PCB contained or destroyed was therefore used, as following:

$$D = C \times Q \times E$$

Where:

- D is the amount of PCDD/F contained or destroyed
- C is the average concentration of PCDD/F in the soil treated or contained;
- Q is the estimated amount of soil treated / contained;
- E is the destruction or containment effectiveness of the specific technology (from 0 to 1, temporarily a value of 1 was adopted as maximum potential technology effectiveness)

Whilst under the project in general enough monitoring data were collected and made available to assess the value of the parameters C and Q, (1) no information concerning the technology effectiveness (the parameter E) was indeed available. The value of parameter E was therefore temporarily set at 1, which means that the

implemented containment or destruction technologies are 100% effective. Therefore, the estimates represent currently the maximum potential amount of PCDD/F contained or destroyed achievable.

Some approximate estimations (chapter 7.3.6) on the PCDD/F release prevented were therefore attempted within the evaluation exercise based on general information made available under the project. Based on the few information available, the following estimates have been derived:

- Pacer Ivy area in Bien Hoa: the amount of PCDD/F currently being prevented to enter the environment thanks to the hydraulic barrier in Pacer Ivy is a range from 215 to 3690 g TEq, to which around 8.7 gTEq of dioxin contained in landfilled contaminated soil, plus 36 gTEq in the sediment trapped in the Pacer Ivy have to be added;
- Phu Cat landfill: around 7500 m3 of PCDD/F contaminated soil were placed in the safe landfill. Based on the average contamination of landfilled soil the amount of PCDD/F prevented to enter the environment has been estimated in around 395 gTE.

Therefore, summing up the average PCDD/F currently contained in Bien Hoa and Phu Cat, an overall amount ranging from 610 to around 4000 g I-TEQ have been contained by actions directly carried out with project funds, whether an additional unknown amount has been contained with governmental resources. Again, this is a very rough estimated based on the best data available, which need to be confirmed by a proper monitoring plan and environmental assessment to be carried out

There are no available data on the initial concentration of soil currently being treated in Da Nang (around 44,000 m³), therefore it is not possible to estimate the destruction of dioxin for that site. It has to be remembered that currently the project in Da Nang is being running independently by USAID under the coordination of MOD; with Office 33 only being informed of the status of the activities.

In any case, even without considering the amount destroyed in Da Nang, the amount of PCDD/F currently contained in Bien Hoa and Phu Cat still quite a huge amount of PCDD/F, comparable to the yearly emission of PCDD/F of a large country, representing a very large risk for the population and the environment, and therefore requiring that the remediation / containment actions are sustained after project ends.

3.2.EXPOSURE REDUCTION

Updated population estimates for the potential population at risk of dioxin exposure at Bien Hoa and Phu Cat Airbases were determined during the preparation of the "Evaluation of Dioxin Project Impact to Environment and People" (3), from interviews with Ward and District leaders. Based on current estimates provided in the report, over 120,000 people residing in wards near Bien Hoa Airbase and 47,000 persons near Phu Cat Airbase are potential beneficiaries of the reduced dioxin exposure achieved thanks to the activities conducted under the Dioxin Project. For further reducing exposure to PCDD/F of this population it is key to sustain the effort aimed at raising awareness on the food-chain related risk, and to sustain access restriction to contaminated areas.

3.3.TECHNOLOGY TESTING

As already pointed out at mid-term, one of the result of the project was the testing of technologies for the destruction / treatment of PCDD/F contaminated soil.

Despite few uncertainties in the effectiveness of the tested technology in reaching the cleanup target when the contamination level is high, the project, by demonstrating a PCDD/F destruction technology and establishing containment infrastructures and safe landfills, contributed significantly to the knowledge and the increased

technological capacity of the relevant stakeholders for problem analysis and remediation of dioxin contamination.

As a result of the mid-term evaluation, it was recommended to "carry out additional tests aimed at a better understanding of the mass balance of the mechano-chemical process and at verifying the effective capability of the technology to remediate high contaminated soil should be carried out under this GEF project". These additional demonstration have been started at laboratory scale (biodegradation by HPC Envirotech (4)), full scale (thermal desorption by Thermodyne (5)) and semi-practical scale (Mechano-chemical destruction by EDL (6)).

The results of the technology testing were introduced during the workshop held in Hanoi on March 18-19 2015 (7)

Based on the technology report drafted by the international and national independent experts (8) there is quite a consensus that the mechano-chemical and the thermal desorption may be considered as technologies already in the commercial stage suitable for the treatment of PCDD/F contaminated soil in Vietnam, whereas the biodegradation technology still requires additional tests to prove its suitability.

The demonstration at pilot, full and large scale for the remediation of PCDD/F contaminated soil is one of the largest tests so far carried out and has to be considered a big achievement of this project. This resulted in data on technology performance made available either for Vietnam itself or for the remediation of sites contaminated by PCDD/F in other countries.

3.4.ACHIEVEMENTS AFTER MID-TERM AND FULFILMENT OF MTE RECOMMENDATIONS

The following recommendations were put forward at mid-term:

Recommendation Solution brought at MTE	Status of compliance
Timely Implementation of a monitoring plan for both Phu Cat and Bien Hoa to check and measure the effectiveness of the containment infrastructures and for the early identification of any residual risk.	This recommendation has only partially fulfilled. The Czech Republic funded sampling equipment and infrastructures and developed a sampling plan for both the airbases. However, based on the available data and interviews carried out, it seems that, a monitoring plan is not implemented yet and most of the sampling equipment is still unused. The issue is that, whilst the project cooperates with MONRE, the equipment provided by the Czech Republic was eventually handed over to MOD, which is in charge of monitoring the hotspots, and which - based on interviews carried out in November 2014 in Bien Hoa - may have budgetary issues for implementing the monitoring plan. It has however to be mentioned that on Jan 2015, data was hand over to Dong Nai Province/Dong Nai DONRE for continuing monitor the area located outside of airbase since 2015. Provincial budget for external monitoring was allocated. for 2010 – 2015 following the Provincial Decision No. 1565/QĐ-UBND on the approval ofthe monitoring plan for Bien Hoa and the surrounding area dated June 21st 2010 and likely to be continued in the next term. USAID has recently started the environmental assessment in Bien Hoa, including monitoring activity (9). Hopefully, handover of operation from the project to the bilateral activity funded by USAID will ensure the proper transmission of information deriving from the monitoring carried out until now.

Extension of technology demonstration.	This activity has been completed, resulting in extensive testing of three technologies, the Mechano Chemical Destruction (6), the batch thermal desorption (5) and the chemical-biological destruction (4). This has to be considered one of the biggest achievement of the project. The technology testing activity resulted in data on technology performance made available either for Vietnam itself or for the remediation of sites contaminated by PCDD/F in other countries.
Securing necessary funds for the completion of containment measures in Bien Hoa as necessary	The containment infrastructures in Bien Hoa were completed, therefore this recommendation has been accomplished. As a further recommendation it has to be considered that one of the biggest benefit of the project (the amount of dioxin contained in Bien Hoa and Phu Cat) represents also an outstanding environmental risk if continuation of activities is not ensured after project closure, The amount of dioxin contained by the hydraulic infrastructure and in Phu Cat is absolutely relevant (calculated as a lower-bound estimate in around 610 gTEq) therefore, if from one side this represent a significant benefit in term of risk reduction, from the other side it is crucial to establish a maintenance and monitoring plan for the infrastructure in Bien Hoa and to implement the existing monitoring plan exists for the Phu-Cat landfill. This is the main sustainability concern for the whole project after closure. As of now, GoV budget for the monitoring starting from 2015 outside the airbase by Dong Nai DONRE is confirmed, whereas no information for monitoring and maintenance of the containment infrastructures inside Bien Hoa airbase was provided by MOD.
Report, by means of an approach as much as possible quantitative, project achievement particularly highlighting PCDD/F source reduction and the associated benefit for the human health and the environment.	The report has been completed by Hatfield consultants. The report contain limited quantitative information related to PCDD/F source reduction - indeed the information provided is mostly based on undisclosed monitoring data stored in the Hatfield - USAID database.
Guidance document on the methodology for testing and procuring remediation technologies, to be compliant with the Stockholm Convention and the country environmental legislation	The draft guidance document has been completed.
While the available timeframe is short (16 months), the communication plan with 67 activities seemed rather ambitious. The	Communication activities were implemented with a narrow budget, focusing in the population in Bien Hoa only. While more than 90% of the surveyed population reported a general understanding about the harmful impact of dioxin, the understanding on remedies for local population (including prevention of harmful exposure, policy for contaminated populations and governmental agencies in charge of the issue) varied. In Bien Hoa, were higher communication frequency was ensured, about 90% of the surveyed population showed awareness on

project should	prevention measures, 80-75% knew about relevant policies, and 30 – 45% was not
consider strategic	aware of the agency in charge of the issues. In Binh Dinh where communication
activities for	activities were limited, the level of unawareness among surveyed population was
implementation, with	rather high: more than 90% did not know about prevention, 50% was not aware of
proper attention on	relevant policies for people affected, and more than 90% did not aware about the
activities targeting	agency in charge of dioxin remediation.
local communities.	

4. ACRONYMS AND ABBREVIATION

CO	Country Office
DOH	Department of Health
DONRE	Department of Natural Resources and Environment
GEF	Global Environmental Facility
I-TEq	International Toxic Equivalent
M & E	Monitoring and Evaluation
MOD	Ministry of Defence
MONRE	Ministry of Natural Resource and Environment
MTE	Mid-term Evaluatio
PCDD/F	Polichloro Dibenzio para Dioxins and Furans
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
TCDD	Tetrachloro Dibenzo para Dioxin
TOR	Term of Reference
UNDP	United Nations Development Programme
US EPA	United States Environmental Protection Agency

5. INTRODUCTION

5.1.PURPOSE OF THE EVALUATION

In compliance with TOR requirements, the principal objective of the evaluation has been to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

This terminal evaluation builds up on the mid-term evaluation which was conducted in July-August 2013, and therefore one of its main focus is to review the project's progress from mid to final project time and to assess whether the project have addressed and duly responded to the concerns of the mid-term evaluation accepted by the management team(s).

The evaluation also provided a technical and independent look at the project and its results, and provides ratings for the key evaluation criteria of relevance, effectiveness, efficiency, sustainability. Recommendations for ensuring sustainability after project closure have been also included in the evaluation report.

The evaluation has been carried out keeping in mind that its results will primarily be used by:

- the UNDP CO and national project teams;
- the national counterparts;
- the UNDP Montreal Protocol Unit, national & regional UNDP offices

The scope of evaluation includes 3 principal components:

- An analysis of the attainment of national environment objectives, outcomes, impacts, project objectives and delivery and completion of project outputs (based on indicators);
- To what extent the overall global project has achieved;
- An evaluation of project achievements according to GEF Project Review Criteria.

5.2.SCOPE & METHODOLOGY

According to TOR requirements, the evaluation has been carried out both as a descriptive assessment and on the basis of a scoring system.

The evaluation required meetings and site visits in Vietnam with all the most relevant stakeholders involved in project implementation, review of the technical and administrative documents, mission reports, meeting minutes produced in the course of project activities. Two project sites (Bien Hoa airbase and Da Nang Airbase) have been visited in the course of the evaluation.

Concerning ranking, the following 6 level score proposed in the TOR for project outcomes and outputs has been adopted, with the numeric values associated to each level:

Rating criteria	Associated numeric value
Highly satisfactory (HS) . The project had no shortcomings in the achievement of	5
its objectives in terms of relevance, effectiveness, or efficiency.	•
Satisfactory (S). The project had minor shortcomings in the achievement of its	4
objectives in terms of relevance, effectiveness, or efficiency.	
Moderately satisfactory (MS). The project had moderate shortcomings in the	3
achievement of its objectives in terms of relevance, effectiveness, or efficiency.	
Moderately unsatisfactory (MU). The project had significant shortcomings in the	2

achievement of its objectives in terms of relevance, effectiveness, or efficiency.	
Unsatisfactory (U). The project had major shortcomings in the achievement of its	1
objectives in terms of relevance, effectiveness, or efficiency.	
Highly unsatisfactory (HU). The project had severe shortcomings in the	0
achievement of its objectives in terms of relevance, effectiveness, or efficiency.	

The evaluators subjectively assigned ranking; however, to ensure consistence, the following criteria has been adopted:

All the project outcomes has been evaluated with 3 different scores with value from 0 to 5 based respectively in the criteria of relevance (R), Efficiency (Eff) and Effectiveness (Ect).

The three criteria were evaluated considering that:

- Relevance implies close logical relationship with, and importance to, the matter under consideration. The
 main objective of the project is *"to minimize the disruption of ecosystems and health risks for people from
 environmental releases of TCDD (Tetra-chloro dibenzo-dioxin, aka dioxin) contaminated hotspots and
 contribute to the national broader goal, which is to overcome the consequences of toxic chemical used in
 the war in Vietnam.", a high relevance score has been therefore assigned to the activities which if
 correctly implemented are directly related to the objective, whilst a lowest relevance score has been
 assigned at activities only indirectly related.*
- 2. Effectiveness is the degree to which objectives are achieved and the extent to which targeted problems are solved. In contrast to efficiency, effectiveness is determined without reference to costs and, whereas efficiency means "doing the thing right," effectiveness means "doing the right thing.". Therefore, a high value of effectiveness has been assigned to outputs/outcomes which reached their original objective, whereas low value has been assigned to outputs/outcome which reached only partially their intended objective.
- 3. Efficiency is the comparison of what is actually produced or performed with what can be achieved with the same consumption of resources (money, time, labor, etc.). Efficiency is an important factor in determination of productivity, therefore a high value has been assigned to activities which have been carried out in due time and which are expected to be carried out without delay.

The three scores obtained with the criteria summarized above were averaged within each outputs, and then the average score was averaged within outcomes among all the outputs of each outcome. Finally, the numeric values were translated in to the nearest rating criteria.

5.3.STRUCTURE OF THE EVALUATION REPORT

The evaluation report is arranged in the following chapters:

- o Introduction (including objective, scope and methodology)
- o Project description and development context;
- Findings of the evaluation: project design; project implementation, project results and impacts
- Conclusion and recommendations
- o Annexes

6. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

6.1. PROJECT START AND DURATION

The project was approved by the GEF on September 15, 2009. The planned duration of the project was 4 years (2010-2014). The Original Project Document was signed by MONRE and Resident Coordinator of UN on 28th June 2010. The preliminary update of the reviewed & revised project was presented to a wide range of stakeholders at the Inception Workshop held in Ha Noi on 15th December 2010.

6.2. PROBLEMS THAT THE PROJECT SOUGHT TO ADDRESS

The Project "Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam" has the objective to remove the barriers that limit Vietnam in dealing with main hotspots contaminated by Dioxin, namely:

- a) The lack of an overall plan to deal with the hotspots and an overall regulatory framework regarding dioxin contamination;
- b) Limited availability of high quality data on site contamination and effects on environments and people;
- c) Technological capacities (essential equipment, knowledge) for problem analysis and for remediation of dioxin contamination;
- d) Institutional capacities for coordination of national and international partners, and for planning and managing site remediation;
- e) Financial resources for remediation to internationally accepted norms;
- f) Capacities for public education and local land use planning to address the sensitive issue of highly toxic materials near populated areas.

6.3. IMMEDIATE AND DEVELOPMENT OBJECTIVES OF THE PROJECT

The immediate objective of the project is to reduce the risk for the population deriving from the release of dioxin in the environment. The global environmental benefit pursued by the project is to destroy or - if destruction is not indeed possible within the project timeframe and budget - contain the dioxin a significant amount found in the contaminate hotspot. The quantitative target was set at inception report as 730 g of gTEq contained (sites of Bien Hoa and Phu Cat) and around 1000 gTEq destroyed during the cleanup of Da nang contaminate sites.

Beside these objectives, the development objectives of the project were to:

- Increase the country capability to carry out sampling and analysis of soil contaminated by dioxin;
- Identify, test and establish technologies for cleanup of POPs contaminated soil;
- Improve the national regulation concerning environmental level of dioxin, with specific reference to cleanup target level for soil and sediment, contamination of the food chain, admissible release level from industrial plants;
- Increase the communication of risk related to the presence of dioxin in the environment with the purpose to reduce the risk for the population through an increased awareness of the risk sources.

6.4.• BASELINE INDICATORS ESTABLISHED

A number of quantitative and qualitative indicators were established in the project result framework, which was revised at inception.

The baseline value and indicators for the project, at objective and outcome level, are summarized in Table 2 below:

Results	Indicator	Baseline value				
Objective: To minimise	Estimated volume of dioxin in	At least 1,736g I-TEQ				
disruption of ecosystems and	hotspots that could potentially be					
health risks for people from	released to the environment					
environmental releases of	Perception of support for appropriate	Two-thirds (67%) of interviewees commenting				
TCDD contaminated hotspots	livelihoods among local communities	on level of support on livelihood development				
· · · · · · · · · · · · · · · · · · ·		in areas surrounding hotspots feel that the				
		level of support is inadequate				
Outcome 1: Dioxin in core	Volume of contaminated soil and	At Bien Hoa: at least 100,000m ³				
hotspot areas contained and	sediment contained and remediated	At Da Nang: at least 70,000 m ³				
remediated		At Phu Cat: at least 2,500m ³				
Outcome 2: Land use on and	Area of land treated to introduce	Only measures are prohibition on some land				
around hotspots eliminates	appropriate land uses	uses, e.g., fishing and cultivation				
risks and contributes to	Satisfaction among local					
environmental recovery	communities in land use on and around contaminated sites					
Outcome 3: Strengthened	Assessment of capacity among	38% of officials in relevant government				
national regulations and	government officials	agencies have not received training or				
institutional capacities	Assessment of capacity among local	awareness raising on dioxin, while 29% do not				
·	communities	have access to information on policies and				
		laws related to dioxin				
		Over 50% of respondents are unable to name				
		agencies responsible for management of				
		contaminated areas				
		Contaminated aleas				

6.5.• MAIN STAKEHOLDERS

As pointed out in the project document, the main beneficiaries of the project activities are the people and communities affected by dioxin contamination living in the vicinity of the three hotspots (including therefore the military troops established in the contaminated airbases), whose health risk will be reduced through the implementation of project activities once the source of the contamination is contained or removed and other dioxin exposure-minimizing measures take hold.

On the institutional side, the main stakeholders of the project were:

- at national level, the Ministry of Defense (MOD) and the Ministry of Environment and Natural Resources (MONRE); Office 33 (which has indeed an overall coordination role in the project). MOD is the official landholder and occupant for all sites and as has been considered as the Project's principle beneficiary of the project.
- at sub-national level: the Departments of Environment and Natural Resources (DONRE) and the Departments of Health (DOH) of the provinces of Dong Nai, Binh Dinh and of the municipality of Da Nang; For implementation purposes, the coordination of these stakeholders' inputs and participation in implementation was maintained by Office 33.
- at international level, the bilateral partners, out of which USAID was the main donor and bilateral partner for the government of Vietnam providing a substantial amount of financial resources and

technical assistance for the cleanup of contaminated sites; the Czech republic, which provided financial resources and technical assistance for the environmental monitoring of the sites; US based foundations (Bill& Melinda Gates Foundation, Atlantic Philanthropies) which established the Dioxin Laboratory; the Ford Foundation which supported the bioremediation demonstration.

6.6.• EXPECTED RESULTS

The key expected results, indicators and their target at outcome level are listed in the table below. The detailed list of expected results and indicators, compared with the achieved results, is reported in Table 6.

Table 3: Expected Project Results, Indicators and Targets at outcome level

	Results Revised at Inception Phase	Indicator	Target		
Outcome 1	Dioxin in core hotspot areas contained and remediated	Volume of contaminated soil and sediment contained and remediated	As a result of the GEF-project and leveraged funds / activitie: all contaminated soil at concentrations greater than 1,000pp and sediment at concentrations greater than 150ppt will hav been treated adequately and residual contamination safel land-filled, and thereby 1,736 g I-TEQ dioxin release will b avoided: at Bien Hoa by the end of 2010; at Da Nang by th end of 2012; and at Phu Cat by the end of 2011. (revised c inception as following: As a base target, an overall level of 1,700 g I-TEQ is recommended as a containment/remediatio target such that this amount is eliminated as a near terr ecological health threat and the amount actually eliminate (destroyed) be 1,000 g I-TEQ, all at Da Nang.)		
Outcome 2	Land use on and around hotspots eliminates risks and contributes to environmental recovery	Existence of action plan for each hotspot	By the end of the project, appropriate land uses have been introduced for at least 10ha at Bien Hoa; 8 ha at Da Nang, and 4ha at Phu Cat		
Outcome 3	National regulations and institutional capacities strengthened	Assessment of capacity among government officials Assessment of capacity among local communities	By the end of the project, at least 70% of officials have received training or awareness raising on dioxin and less than 5% of officials are unable to access information on policies and laws related to dioxin By the end of the project, less than 15% of respondents are unable to name agencies responsible for management of contaminated areas		

7.1.PROJECT DESIGN / FORMULATION

7.1.1. Analysis of LFA/Results Framework (Project logic /strategy; Indicators)

As already pointed out at mid-term evaluation, the project logic and the project results framework are very straightforward, including only 3 technical components. The objective of the project is also clear At project design the project scope was delimited in a realistic way; the project correctly identified the issue of the three hotspots as its main target, and indeed the three components (1.Remediation; 2.Land use and communication; 3. Regulatory framework and communication strategies) integrates each other in a very logical and effective way. The project was very ambitious but not unrealistic: in any case, at inception, the quantitative goal in term of dioxin destruction was revised with the purpose to take into account the intrinsic difficulties to destroy PCDD/F, in the following way:

• "As a base target, an overall level of 1,700 g I-TEQ is recommended as a containment/remediation target such that this amount is eliminated as a near term ecological health threat and the amount actually eliminated (destroyed) be 1,000 g I-TEQ, all at Da Nang."

7.1.2. •Assumptions and Risks

At project design, financial risks were considered greater (scored "M") than the technical risks linked to the correctness of estimation of the exact area and volume of the highly contaminated areas at the hotspot ("L"), the correctness of contamination level ("L"), and the outcomes of the technology testing ("L"). At project end, it may be affirmed that a significant uncertainty continues in the determination of the boundary of the contamination, especially in the Bien Hoa hotspot, and in the identification of the effective technological approach for soil cleanup, whilst the leveraging of funds has been very effective. Therefore, whilst the project risks have been properly identified, the technical risks was underestimated and the mitigation measures (especially on the side of monitoring for a better individuation of boundary of the contamination and in technology testing) were not completely effective. Financial sustainability seems also to affect the continuation of the monitoring inside the air bases.

7.1.3. Lessons from other relevant projects (e.g., same focal area) incorporated into project design

The project document does not explicitly mention any previous project or incorporates lessons from other UN/GEF similar projects, even because this project is rather unique in this objectives and scope. However, the project did build on a series of monitoring information or cleanup activities conducted with bilateral or governmental funds in Vietnam to characterize Dioxin contaminated soil and to store contaminated sites (Bien Hoa)¹

¹ The project document mentions that "The project builds on results from four dioxin contamination assessments. (a) The Z1 (Bien Hoa airbase, 1994/1995), Z2 (Da Nang airbase, 1997/1998) and Z3 (Phu Cat airbase, 1999/2002) project by the Vietnamese Ministry of Defence; (b) a collaboration between US-EPA and VAST on sampling and contamination analysis; (c) the project "Assessment of Dioxin Contamination in the Environment and Human population in the vicinity of the Da Nang airbase, 2006/2007" by Office 33 and Hatfield Consultants Limited (Vancouver, Canada), with funding from Ford Foundation; and (d) soil and sediment samples taken and analyzed under the UNDP preparation project, by the Viet Nam - Russia Tropical Centre (VRTC) under the MOD and Hatfield Consultants"

7.1.4. Planned stakeholder participation

The project identified since the very beginning the main stakeholders as The Ministry of Natural Resources and Environment and the Ministry of Defence. The project also correctly envisaged the involvement other ministries through the project management structures (Committee 33 and working groups) and by taking part in some of the training activities.

Local officials, as well as local communities, have also been identified as important stakeholders and indeed the project endeavoured to ensure their participation and involvement.

7.1.5. Replication approach

The project is aimed at carrying out remediation of dioxin contaminated sites which are rather unique in term of their size and of the level of contamination.. The assumption is that any technology, which is developed under the project for the cleanup of contaminated sites, may be then easily replicated to other countries / situation. In the light of the achieved outcomes, it may be affirmed that the project constitutes a valuable source of information, examples and lesson learned for any future remediation of POPs contaminated sites.

7.1.6. UNDP comparative advantage

As from the GEF Council Document on "Comparative Advantages of the GEF Agencies, "UNDP's comparative advantage for the GEF lies in its global network of country offices, its experience in integrated policy development, human resources development, institutional strengthening, and non-governmental and community participation. UNDP assists countries in promoting, designing and implementing activities consistent with both the GEF mandate and national sustainable development plans. Based on the above it can be affirmed that, beside the technical aspects of the project, the competitive advantages of UNDP perfectly fit the developmental and technical features of the project. This is confirmed by the fact that at the time of project drafting, under the POPs focal area, the GEF website was listing 60 national UNDP projects with an overall budget of 125 MUSD, and 4 regional/global project with an overall budget of 18.5 MUSD. Of these, 21 are full size projects (not NIP enabling activities) for an overall budget of around 100 MUSD. At the time of project starting, the UNDP's Country Programme document explicitly aimed to strengthen capacities to ensure that environmental concerns are integrated with poverty reduction and economic growth, "contributing to fulfilment of obligations under the global environment conventions" including the Stockholm Convention.

7.1.7. Linkages between project and other interventions within the sector

Although very specific, the project is well integrated with the Vietnamese policy on contaminated sites and with other intervention in the field of cleanup of contaminated sites, destruction of POPs, establishment of environmental standards, and PCDD/F reduction, especially in the section related to the setting up of environmental standards (Output 3.1, 1.Completed national regulatory framework for maximum permissible dioxin discharges and contamination into/of soil, water and air and contamination of food products/animal /fish feed). As an example, this activity integrates well with the activities envisaged by the GEF/UNDP project "Viet Nam POPS and Sound Harmful Chemicals Management Project" recently endorsed by the GEF, "Outcome 3.1 Key policies, regulations and technical guidlines for management of POPs contaminated sites are in place"

7.1.8. Management arrangements

This aspect has been already discussed in detail at MTE, and the project did not undergo significant change in the project management in its last stage of implementation. MONRE is responsible for the implementation and management of the Project. The implementation and management is led by the National Project Director (NPD), appointed by MONRE, and includes a Project Management Unit (PMU) headed by a Project manager. Strategic decisions have been jointly agreed between the NPD and UNDP senior management, sometimes based on formal consultations with other project stakeholders (such as in the case of procurement plans). The Director of Office 33 has been appointed National Project Director (NPD) and is responsible for overall management and implementation of the Project.

The Project Management Unit (PMU), consisting of a staff of four, under the Project Manager (PM) is responsible for day-to-day project implementation including developing budgets, work plans, procurement activities financial management and human resources.

The management arrangement, envisaging a PMU tightly integrated into the Office 33 structure and cooperating on a day-to-day basis with UNDP worked efficiently. It is recognized by all the stakeholders that the PMU team is well organized and motivated, and all the team staff is use to work independently with clear understanding of their task and responsibility.

7.2.PROJECT IMPLEMENTATION

7.2.1. Adaptive management (changes to the project design and project outputs during implementation)

Beside the better specification of objectives in term of PCDD/F disposal or release reduction, (see 7.1) the project underwent only a limited change after implementation in Outcome 2: Land use on and around hotspots eliminates risks and contributes to environmental recovery. At mid-term it was reported that basically this component has been pulled out from the project, as the land use of the military areas is completely under the responsibility of MOD, and also due to confidentiality issues raised by MOD. One of the recommendations of the mid-term evaluation was that "A way to exchange information on the land use issues in military areas should still be pursued. At a minimum, the project should draft a site-specific guidance document, based on the available knowledge, related to the suggested land use of the military areas providing indication to be adopted before, in the course and after remediation". Following this recommendation, meetings were held within PMU and office 33, and two workshops on land use were (March and October 2014), basically for sharing the information related to the level of contamination of the Bien Hoa airbase. Some of the budget for component 2 was re-allocated to the following activities:

- Additional funding for sampling and monitoring to improve site characterisation and monitoring : 50 additional samples taken, analyzed and reported in Nov 2013
- Additional funding for extension of technology demonstration: further technology demonstration carried out, reports made available in February 2015.

7.2.2. Feedback from M&E activities used for adaptive management

Project reporting was used by UNDP for monitoring the project performance and for addressing outstanding issue by adopting proper corrective action and adapting the project. Quarterly and annual report provide useful information for understanding project status, achievements and main issues. As far as the mid-term evaluation report is concerned, its recommendation were endorsed by UNDP which posted in the evaluation resource website both the midterm evaluation report and the management response. The recommendations resulted in new activities or corrective actions which were implemented after mid-term evaluation. The

recommended adaptive actions identified at MTE and the level of their accomplishment is described in section 3.4.

7.2.3. Project Finance:

In Table 3 and Table 4 the updated project expenditure and project co-financing are summarized.

Table 4 Summary of project total expenditure as of December 2014 (Source: UNDP)

	Budget	Total expenditure end 2014
Outcome 1 Dioxin in core hotspot areas contained and remediated	3,193,000.00	3,021,558.62
Outcome 2 Land use on and around hotspots eliminates risks and contributes to environmental recovery	195,000.00	87,701.91
Outcome 3 National regulations and institutional capacities strengthened	1,120,000.00	1,316,074.46
Outcome 3 Czech fund	80,515.00	80,515
Project management	469,000.00	439,249.49
Total	5,057,515.00	4,945,099.78

Table 5: Summary of Co-financing to the Project (Source: PMU)

#	Sources	Туре	Amount committed as Prodoc. (US\$)	Updated amount committed Amount	Leveraged funds	Funds Distributed up to June 2013	Balanc e	Note
1	MOD Viet Nam	Parallel	5,300,000	5,300,000		5,300,000	0	
2	Government of Viet Nam for remediation	In kind	4,390,000	4,390,000			4,390,0 00	4,390,000 is expected to be distributed in 2014
		Parallel		1,700,000	1,700,000	1,000,000	700,00 0	Outcome 1: Dioxin remediation in Da Nang
3	Government of Viet Nam for management	In kind	1,000,000	1,000,000		700,000	300,00 0	Expenseses for management at 3 airbases; travelling to hotspots; Dongnai province has monitoring dioxin contamination nearby airbase since 2011 and so on;

4	Local authority (Da Nang)	In kind	200,000	200,000		200,000	0	Expenses for management at Da Nang airbase and travelling for meetings, discussion on dioxin treatment in Da Nang airbase and other related activities
5	Office 33	In kind	110,000	110,000		110,000	0	Expenses for contributions from Office 33 such as room, members from Science Technology Consultancy Council for Committee 33.
6	Government of							Outcome 3:
	Czech Republic	Parallel	1,500,000	500,000	-1,000,000	300,000	200,00 0	support to development of
		GEF/UNDP dioxin project		76,000	76,000	76,000	0	many other sources and development of monitoring system and training on dioxin analyse
7	US Government	Parallel	8,000,000	43,000,000	35,000,000	38,220,000	4,780,0	Outcome 1:
							00	Dioxin
	Ford Foundation	Parallel	6 000 000	6 000 000		6 000 000	0	remediation in DN
			0,000,000	0,000,000		0,000,000	4 500 0	
9	Gates Foundation	Parallel	2,685,550	2,685,550		3,885,550	1,500,0 00	
10	Atlantic Philanthropies	Parallel	2,700,000	2,700,000				
11	UNDP	Parallel	450,000	450,000		450,000	0	
	Total		32,335,550	68,111,550	35,776,000	56,241,550	11,870, 000	
	USAID- Asia				50,000	50,000	0	Outcome 1: Support to capacity building on soil contaminated management
	SIDA Sweden				10,000	10,000	0	Outcome 3: Capacity building on risk assessment

HPC Envirotec,		5,000	5,000	0	Outcome 3 and 1:
France					on the way to
					raising fund from
					EU partner and
					technology
					demonstration to
					find out solution
					to treat dioxin and
					other
					contaminants as
					As as well.

7.2.4. Monitoring and evaluation: design at entry and implementation (scoring; highly Satisfactory)

The project document included a detailed monitoring ad evaluation plan, developed on the basis of UNDP experience gathered by the implementation of many POPs related projects. The monitoring and evaluation plan envisaged:

- A project inception phase to be conducted "with the full PMU, relevant government counterparts, cofinancing partners, the UNDP-CO and representatives from the UNDP-GEF Regional Coordinating Unit, as well as UNDP-GEF (HQs),". Key outputs of the inception phase were the revision of the project (in term of remediation objectives, limited revision of baseline and objectively verifiable indicators) and the identification of proper implementation arrangements. Inception report and inception workshop documentation were made available to the evaluation team.
- The identification of key monitoring event and documentation, namely: yearly visits to the project sites, annual monitoring through the annual review of the UN Programme Coordination Group (PCG) on Sustainable Development (PCG-8), subject to an Annual Project Report to be prepared by PMU. The APRs were made available to the evaluation team.
- Project reporting and planning: APRs, AWPs, QPRs and QWPs.
- A Terminal Tripartite Review, for deciding whether any actions are still necessary in relation to sustainability of project results.
- Mid-term and Terminal Independent Evaluation. The mid-term evaluation was completed on August 2013 and all the recommendation provided by the evaluation team were considered in the management response by UNDP and implemented in the final part of project cycle.

7.2.5. UNDP and Implementing Partner implementation / execution coordination, and operational issues (Scoring: Satisfactory)

Despite the challenging objective, there were no major issues in the implementation of the project. At midterm, it was observed that Office 33 and the project PMU worked indeed as integrated structures, as most of the members of the PMU are at the same time members of Office 33, including for instance the National Project Director, which is at the same time the head of Office 33. In turn, UNDP CO worked in close relation with PMU.

The project, on the other side, was very effective in coordinating and integrating the work of the various actors working on the project related activities, of which the most relevant are:

- Laboratories carrying out sampling and analytical work; (the VEA lab, the Vietnam / Russian Tropical centre)
- International Firms supported by international donors performing site characterisation, conceptual modelling, sampling and analysis (for instance, the Dekonta company under the Czech co-financed project;
- Firms carrying out testing of disposal technology: testing of EDL technology was partially funded by the New Zealand but the testing was carrying out under coordination of PMU
- USAID, which carried out the Environmental Assessment and the remediation of the Da Nang, site, and which is now starting the Environmental Assessment in Bien Hoa
- The Hanoi National University, Department of Chemicals, which carried out the consultancy services for establishing standard and emission limits for PCDD/F in the environment.
- International consultants

Most of the issues identified in the course of midterm evaluation were apparently resolved in the final stage of the project as follows:

- Two workshops on land use planning were carried out on March 2014 and October 2014 in Bien Hoa to illustrate the contamination status of the site.
- Remediation activities in Bien Hoa were handed over to MOD, which is now coordinating the Environmental Assessment being carried out with the financial and technical support of US AID. That envisaged the coordination between PMU, Office 33 and MOD, which in the first stage of the project seemed limited.

Limited coordination issues remained in the coordination between MOD and office 33 in Da Nang, being Office 33 only periodically informed on the remediation activities being carried in Da Nang. The evaluator was allowed only a very limited visited to the remediation site, and was not provided with any technical information on the site beside the generic information reported in the USAID website.

Coordination / communication issues, not identified at the time of midterm evaluation, emerged with some of the donors, in particular with the Czech government, as reportedly² Office 33 and MOMRE did not ensured the implementation of the monitoring plan funded by the Czech embassy within the timeframe agreed, and despite the fact that monitoring equipment were donated and delivered to the project. Further talking with MOD representatives (reference to meeting in Bien Hoa) confirmed that indeed some budgetary issue might hinder the completion of the activities envisaged by the Czech monitoring plan.

Based on the outcome of the meetings, the need exists to improve the communication on monitoring data among different ministries (MONRE, MOH, MOD) and different level of the same ministry (MONRE versus DONRE). In general, DONREs are not fully satisfied on the level of information received from the central government on the implementation of the project. At the same time, DONRE needs to be authorized by the central government to release / disseminate environmental data.

7.3.PROJECT RESULTS

7.3.1. Overall results (attainment of objectives) (Scoring: satisfactory)

The evaluating Table 6 below includes the additional outcomes achieved after mid-term evaluation and the updated scoring. Changes or new achievement after mid-term are reported in bold and highlighted in grey in the table. Based on the available data and information, the "Satisfactory" scoring proposed at mid-term evaluation can be confirmed.

² Meeting of the evaluation team with Czech Embassy in Hanoi, November 2014

Table 6. Rating of the Relevance, Efficiency and Effectiveness of Project Outcome and Outputs.

	Results Revised at	Indicator	Target	Achievements	Rel.	Effic.	Effect.	Avg	Rating
Outcome	Dioxin in core hotspot areas contained and remediated	Volume of contaminated soil and sediment contained and remediated	As a result of the GEF-project and leveraged funds / activities, all contaminated soil at concentrations greater than 1,000ppt and sediment at concentrations greater than 150ppt will have been treated adequately and residual contamination safely land-filled, and thereby 1,736 g I-TEQ dioxin release will be avoided: at Bien Hoa by the end of 2010; at Da Nang by the end of 2012; and at Phu Cat by the end of 2011.	The initial outcome indicator was overly ambitious. Partially revised at inception. At midterm: containment at Bien Hoa partially completed; highly contaminated PCDD/F soil disposed in a safe landfill for temporary containment; in Da Nang a turnkey remediation project based on thermal desorption is being carried out by USAID. In Phu Cat, 7500 m3 of PCDD/F contaminated soil where stored in a safe landfill . The level of contamination of the soil inside the landfill was from 600 ppt to around 250000 ppt. In Bien Hoa, the infrastructures built under the project (interim measures for runoff containment) concerned around 102000 m3 of soil with a contamination ranging from 3500 to around 50000 ppt, with a peak value of 962500 pptTe. It is estimated that an amount in the range of 610 to 4000 g I-TEq have been contained by the interim measures in Bien Hoa and Phu Cat, while the amount of PCDD/F destroyed in Da Nang cannot be quantified yet as the remediation is still ongoing and data are not available. The exposure to PCDD/F was reduced for around 120,000 persons living nearby the Bien Hoa airbase and 47,000 living in the surrounding of the Phu Cat airbase	4.5	4.0	3.8	4.1	HS

Output 1.1	Containment/remediation targets and remediation action plans for each hotspot completed	Existence of action plan for each hotspot	Action plans for each site completed within 4 months of start of project implementation	A draft master plan prepared and discussed in several meetings and a specific workshop for the Bien Hoa airbase. In Da Nang an EA has been developed by USAID. In Phu Cat, a report on the safe landfill technology has been drafted. Reports 1 to 31. Bien Hoa site has been handed over to MOD and currently USAID is starting with an EA to define a remediation plan	4.0	4.0	4.0	4.0	S
Output 1.2	Government personnel trained in selected containment and remediation technologies	Number of government personnel trained	At least 50 personnel trained within 12 months of the start of project implementation	A Training course in association of the testing of the MCD technology in Bien Hoa airport has been carried out. Further people trained after mid-term. Report 32	4.0	4.0	4.0	4.0	S
Output 1.3	Spatial delineation of heavily contaminated areas, based on supplementary sample analysis including newly identified areas at Phu Cat and Bien Hoa	Completed spatial delimitation of contaminated areas	Additional samples collected and analyzed within 12 months of the start of project implementation	A comprehensive report on the contamination status of Bien Hoa, Da Nang and Phu Cat airbases drafted, summarizing all available data and results from previous monitoring. Based on interviews with experts and analysis of available reports, In Bien Hoa the boundary of contamination has not been completely identified. There are surveys based on different principles (Historical information, regular grid, random, expert judgement, conceptual model). Final report under preparation. The Czech republic monitoring plan has not been implemented yet. although monitoring euipment has been delivered. Dong Nai DONRE allocated funds for the monitoring plan outside the airbase starting from 2015 Totally 155 samples on PCDD/F in Bien Hoa were analyzed.	4.0	3.0	3.0	3.3	S

Output 1.4	Pilot scale demonstration of remediation technology for potential use at Bien Hoa and/or Phu Cat	Initiation of remediation	Remediation testing initiated at all sites within 8 months of the start of project implementation	The MCD technology has been tested in Bien Hoa on 150 tons of PCDD/F contaminated soil. The test demonstrated the suitability of the technology in treating PCDD/F soil and the needed improvement of operational parameters for treating PCDD/F soil contaminated over 20000 ppt. It also established a procedure for testing new technologies. Further technology testing at full scale, pilot scale and laboratory scale on three technologies (MCD, TD and bioremediation) have been completed. A draft guideline for the selection and procurement of POPs destruction technology prepared. Report 34 to 37.	5.0	4.0	4.0	4.3	HS
Output 1.5	Full containment and/or isolation completed at Phu Cat and Bien Hoa and funding for full scale remediation identified while coordination mechanism functioning at Da Nang based USAID financing	Existence of plan for any areas not remediated during the life of the project	A plan for any untreated sub- sites is completed at least 6 months before the end of project implementation	In Phu Cat, the planned safe landfill for the containment of PCDD/F soil has been established. In Bien Hoa the construction of infrastructures and trenches for limiting the PCDD/F spreading into the environment have been completed by February 2014. Reports 26, 38, 29, 40	5.0	5.0	5.0	5.0	HS
Output 1.6	Monitoring systems operational at all hot spots to ensure performance measurement against containment and remediation goals as applicable	Existence of monitoring plan	A monitoring plan is completed no more than 6 months after the start of project implementation	A detailed long term monitoring plan for Phu Cat has been developed by Dekonta under the activities co- funded by the Czech republic. The groundwater monitoring system is being completed. A conceptual model for Bien Hoa containing indications on migration paths for PCDD/F and on risk scenario was also drafted, which will constitute the basis for further monitoring and containment activities. Reports 59-60. Unfortunately, the monitoring plan was not implemented vet	5.0	4.0	3.0	4.0	S

				despite recommendation at Mid-term. However the Dong Nai DONRE allocated funds for carrying out monitoring outside the airbase					
Outcome 2	Land use on and around hotspots eliminates risks and contributes to environmental recovery	Existence of action plan for each hotspot	By the end of the project, appropriate land uses have been introduced for at least 10ha at Bien Hoa; 8 ha at Da Nang, and 4ha at Phu Cat	This outcome (outputs 2.1 and 2.2) only partially achieved has the overall responsibility of the management of military areas falls under the MOD. In any case the project facilitated communication on the land use options by holding meetings and workshops as recommended at mid- term.	4.0	3.0	3.0	3.3	5
Output 2.1	Overall land use plan (including zoning) and an action plan for environmental recovery in each of the affected areas, based on Environmental Impact Assessment (EIA) recommendations completed	Existence of plan for any areas not subjected to land-use modification during the life of the project	Action plans for each site completed within 6 months of start of project implementation	Under MOD responsibility – not carried out by the project. Only an informal report available (70). Two workshops on land use carried out to facilitate communication on land use.	4.0	3.0	3.0	3.3	S
Output 2.2	Environmental recovery action plans and other land use measures in and around each of the three hotspots implemented	Existence of action plan for each hotspot	A plan for any areas not subject to land-use modification during the life of the project is completed at least 6 months before the end of project implementation	Under MOD responsibility – not carried out by the project. Only an informal report available (70). Workshop on land use carried out	4.0	3.0	3.0	3.3	S
Output 2.3	Public environmental awareness /information and education programs implemented	Number of local residents having access to information	By the end of the project the percentage of local adult residents who do not know about dioxin is less than 1%, while the percentage who receive information from multiple sources is over 60%	High risks were initially communicated to local community living around Bien Hoa airport. A more comprehensive communication strategy was formulated with plan of actions as being merged with 3.4 (stakeholder communication). Implementation of this plan of actions started in May 2013.Starting from 2013 and until	4.0	3.0	3.0	3.3	S

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				early 2015, several communication events have been carried out. but covering a limited population in Bien Hoa The impact of the communication activities were significant on the target population, while needs for proper communication with local residents in Binh Dinh and other neighbouring communes in Bien Hoa remained.					
Outcome 3	National regulations and institutional capacities strengthened	Assessment of capacity among government officials Assessment of capacity among local communities	By the end of the project, at least 70% of officials have received training or awareness raising on dioxin and less than 5% of officials are unable to access information on policies and laws related to dioxin By the end of the project, less than 15% of respondents are unable to name agencies responsible for management of contaminated areas	Standard on PCDD/F contaminated soil were implemented. Standard limits for Industrial emission are under approval	5.0	3.5	3.5	4.0	S
Output 3.1	National regulatory standards for maximum permissible dioxin discharges and contamination into/of soil, water and air and/ or human dioxin TDI applicable to general population and vulnerable populations developed and adopted	Minimum standards adopted	By the end of the second year of project implementation, a minimum standard of no more than 1000ppt for dioxin contamination of soil and sediment has been officially adopted	A standard of 1000 ppt for PCDD/F contaminated soil and 150 ppt for sediment is currently adopted as target for all the remediation / containment activities. The standards have been officially adopted but are not mandatory. Analysis of existing TDI and of emission limit for PCDD/F from industrial sources has been drafted; emission limit proposed for industrial sources under approval. emission standard for plant TCVN 9737:2013 approved by the ministry of science and technology Reports from 71 to 76	5.0	3.0	3.0	3.7	S
Output 3.2	Capacities of Office 33 for coordination, fund mobilisation, dioxin contaminated site identification/inventories, and dioxin data base operation, and experience sharing at all levels including international cooperation strengthened.	Number of lessons from pilots disseminated at different levels International funds for remediation leveraged in addition to baseline	By the end of the project, in a survey of officials outside Dong Nai, Da Nang and Binh Dinh provinces, at least 50% are able to report at least one lesson generated by the project	The first of the 2 targets has a very low measurability, and requires a rigorous assessment of the baseline. Concerning the second target, it is evident that the project was able to raise interest and coordination among stakeholders, so that a larger amount of funding compared to	5.0	3.0	3.0	3.7	S
				when project started is					
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				when project started is					
				remediation of the hot					
				spot sites. However,					
				due to the large budget					
				estimated for					
				completing the					
				remediation, these					
				funds would not be					
				enough vet. The					
				project supported the					
				Office 22 in developing					
				the Netional Action					
				the National Action					
				Plan which has been					
				recently approved.					
				Reports from 77 to 81.					
Output	Institutional and	Establishment	A new laboratory under the	There are 2	5.0	5.0	5.0	5.0	HS
3.3	individual capacities for	of new	auspices of MONRE	laboratories working					
	site investigation. risk	international-	undertakes state-of-the-art	for the project: the					
	assessment	standard	analysis of dioxin	laboratory of the					
	contaminated site land	Jaboratory	contamination and is used by	Vietnam-Russian					
		laboratory	internet is not all and is used by						
	use planning and		international clients	nopical centre,					
1	monitoring, and planning			established with the					
1	and management of cost-			support of the former					
1	effective remediation			Soviet Union, which					
	strengthened			carried out around 200					
				samples and analysis					
				out of an overall					
				number of 2000					
				camples: and the VEA					
				Samples; and the VEA					
				Dioxin Lab (under					
				MONRE) , supported					
				by the Bill Gates					
				foundation and the					
				Atlantic Philanthropies,					
				which provided UNDP					
				with the full database					
				of analysis performed					
				or analysis performed.					<u> </u>
Output	A communication strategy	Number of	By the end of the project	Several comprehensive	5.0	3.0	3.0	3.7	5
3.4	vis-à-vis national and	domestic	there have been at least 30	thematic reports and					
	international industries,	communication	domestic communication	newsletters were					
	consumers and others	events	events	produced by the					
	implemented			project for					
				international					
				dissemination Two					
				articles were					
1				articles were					
				presented in					
1				international					
				conferences. Most of					
1				the project reporting					
				has been translated or					
1				originally drafted in					
				English, being					
1				therefore suitable for					
1				international					
1				dissemination DMU					
1				norticipatos in					
				participates in					
1				uedicated sessions in					
				the Dioxin conference,					
1				and organize annual					
1				international meetings					
				on the Dioxin situation					
1				in Vietnam. A relevant					
				number of					
1				communication events					
				and workshop held in					
1				2012 and 2014					
1				2015 and 2014.					
1		1	1	EREPORTS 9() to 99		I	1		

Outcome	Project management,		Quarterly and annual	5.0	4.0	4.0	4.3	HS
4	monitoring and		reports made available					
	evaluation done in		to the evaluators.					
	accordance to agreed		Quarterly work plan					
	rules		not available. Good					
			synergy and					
			coordination among					
			PMU and UNDP CO.					
			The PMU					
			demonstrated a high					
			technical capacity and					
			understanding of					
			project needs PMU					
			has the capacity to					
			interact at					
			international level on					
			the technical issues					
			related to dioxin.					
			Reports 100 to 111					
			Overall project rating	4.6	3.6	3.6	3.9	S

7.3.2. Relevance(*)

Table 7: Expected impacts and project relevance with GEF4 indicators.

Expected GEF 4 impacts	Main GEF 4 indicators	Project relevance
GEF-supported countries have strengthened capacity for POPs management and consequently strengthened capacity for the general sound management of chemicals	Regulatory and enforcement capacity in place	The project envisages a specific Outcome (Outcome 3) for the strengthening of national regulations and institutional capacities. This outcome includes: Output 3.1 (completed national regulatory framework); Output 3.2 (Strengthened capacity of Office 33); Output 3.3 (Strengthened institutional and individual capacities for site investigation); Output 3.4 (communication strategies).
The risk of adverse health effects from POPs is decreased for those local communities living in close proximity to POPs wastes that have been disposed of or contained	Reduced risk of exposure to POPs of project-affected people	The project has the main objective to "to minimise disruption of ecosystems and health risks for people from environmental releases of TCDD contaminated hotspots", therefore is relevant. The project could however have benefitted of a quantitative indicator for assessing the reduction of the exposure of people to dioxin.

By any evidence, the project is of great importance also for achieving objective listed by Objective 1 of the GEF 5 Chemical strategy, as following (**Error! Reference source not found.**)

Table 8: relevance of the project with the GEF5 chemical strategy

(c) POPs releases to the environment reduced;	By implementing remediation and containment at the hot spots, the project pursues the reduction of the release of POPs to the environment.
(d) POPs waste prevented, managed, and disposed of, and POPs contaminated sites managed in an environmentally sound manner; and	The project tested environmentally sound technologies for the destruction of PCDD/F in soil, and established a scientifically sound framework for the evaluation of destruction technologies in compliance with SC.
(e) Country capacity built to effectively phase out and reduce releases of POPs.	By demonstrating and implementing destruction technologies and building infrastructures for the containment of PCDD/F, and developing monitoring systems and procedures, the project will increase the country capacity.

In conclusion, it may be affirmed that the project activities were all highly relevant to the SC objectives, the GEF focal area objectives and the country needs; and the way the activities have been implemented are all relevant to the outputs and outcome sought.

7.3.3. Effectiveness & Efficiency (Satisfactory)

Effectiveness. In general, almost all the project objectives were achieved at project end, some of these even before the expected deadline. Therefore, the effectiveness of the project has to be considered high. The general objective "to minimize disruption of ecosystems and health risks for people from environmental releases of TCDD contaminated hotspots" has been partially achieved, as under the project concrete actions aimed at limiting as much as possible the spreading of TCDD pending implementation of final remediation

activities were carried out in Bien Hoa, by means of construction of a barriers / trenches system for limiting the transport of TCDD with runoff water, and in Phu Cat, by placing all the contaminated soil into a specially designed safe landfill.

It is estimated that the amount of PCDD/F been contained by the interim measures in Bien Hoa and Phu Cat ranges between 610 to 4000 g/TEq while the amount of PCDD/F destroyed in Da Nang cannot be quantified yet as the remediation is still ongoing and data on the concentration of PCDD/F in the stockpile are not available yet. Unfortunately, it was not possible to obtain quantitative data on the remediation in Da Nang as the only information made available were the ones published under the USAID website, which does not contain any data on the dioxin contamination of the soil being treated by thermal desorption.

The exposure to PCDD/F was reduced for around 120,000 persons living nearby the Bien Hoa airbase and 47,000 living in the surrounding of the Phu Cat airbase. There are concerns on the continuation of further monitoring under the project, although in Bien Hoa now USAID, under MOD coordination, is takin over the monitoring activities for Environmental Assessment purposes.

• **Efficiency**. The efficiency of the project has to be considered high in almost all the activities performed which were all carried out within the expected timeframe or with limited delay.

7.3.4. Country ownership

Vietnam ratified the Stockholm Convention on 22/07/2002 and is one of the most active countries in implementing project aimed at the phasing out and ESM of POPs, as well as the management of hazardous waste and chemicals.

The Government of Vietnam is currently implementing, starting or closing 8 national projects related to POPs and chemical management and funded by the GEF (

<u>GEF_ID</u>	<u>Country</u>	Project Name	<u>Focal</u> Area	<u>Agency</u>	<u>Project</u> Type	<u>GEF Grant</u>	<u>Cofinancing</u>	<u>Status</u>
<u>1450</u>	Vietnam	Development of National Implementation Plan for Vietnam in the Process of Accession, Implementation and Enforcement of the Newly-signed Stockholm Convention on POPs	POPs	UNDP	EA	500,000	150,000	Under Implementation
<u>2974</u>	Vietnam	PCB Management Project	POPs	World Bank	FP	7,000,000	10,500,000	Under Implementation
<u>3011</u>	Vietnam	Introduction of BAT and BEP methodology to demonstrate reduction or elimination of unintentionally produced POPs releases from the industry in Vietnam	POPs	UNIDO	MSP	750,000	1,590,000	Project Completion
<u>3032</u>	Vietnam	Environmental Remediation of Dioxin Contaminated Hotspots in Vietnam	POPs	UNDP	FP	4,977,273	25,350,000	Under Implementation
<u>3105</u>	Vietnam	Building Capacity to Eliminate POPs Pesticides Stockpiles	POPs	UNDP	FP	4,300,800	6,540,109	Under Implementation

Table 9: Approved national projects funded by the GEF in Vietnam

<u>4838</u>	Vietnam	Updating Vietnam National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants	POPs	UNDP	EA	225,000	160,000	CEO Approved
<u>5067</u>	Vietnam	Vietnam POPS and Sound Harmful Chemicals Management Project	POPs	UNDP	FP	2,550,000	10,900,000	CEO Endorsed
<u>5870</u>	Vietnam	Minamata Convention Initial Assessment in Vietnam	POPs	UNIDO	EA	500,000	47,000	CEO Approved
Subtota	Subtotal					20,803,073	55,237,109	

It has to be recalled that the the Vietnamese government specifically established the "Committee 33" to address the issues of PCDD generated by the USA-Vietnam war; Office 33 examines all the proposed activities related to dioxin and submit these to Committee 33 for approval. The project management unit is indeed established in close relationship with Office 33, and at the same time, provides technical and financial support to it and benefits from the capacity of Office 33 to interact with institutional stakeholders at all levels.

On the more wide issue of POPs contaminated soil, it is important to recall the recent development of Vietnamese policy:

- Vietnam Government is carrying out activities related to the management and treatment contaminated sites since the approval of the Decision No.64/2003/QD-TTg of April 22, 2003 approving the "Plan for thoroughly handling establishments which cause serious environmental pollution".
- In December 2010, the government of Vietnam issued the decision 1946 /QĐ-TTg, "Approving the Plan to treat and prevent environmental pollution caused by pesticides stockpiles all over the nation".
- The government is currently allocating funds for cleanup POPs and pesticide contaminated sites for the period 2015 – 2025. In September 2012, the "National Target Program on Pollution Mitigation and Environment Improvement for the period 2012 – 2015" (NTP PMEI) was signed by the government with the decision 1206/QD, allocating 2500 billion Vietnamese Dong from the central government.
- On 25/12/2013, the Minister of Natural Resources and Environment signed the circular 43/2013/TT-BTNMT prescribing national clean-up standards for lands contaminated by pesticides, with values differentiated on the basis of land use. The circular is adopted with support from the UNDP/GEF pesticide project.

The aspect of country ownership has been already evaluated and considered high at midterm evaluation. The new meetings and interviews held during the terminal evaluation confirmed the previous findings. The government of Vietnam, still at local and central level, is highly concerned with the risk for the environment and the population associated with the dioxin contamination of soil. In general, the issue of soil contamination by chemicals (POPs pesticides, industrial chemicals, and dioxin) is at the core of the environmental policy of the Vietnamese government.

7.3.5. Sustainability (Risk from moderate to low)

Sustainability is understood as the likelihood of continued benefits after the GEF project ends. Usually, the following sub-components of sustainability need to be assessed: Financial; Sociopolitical; Institutional framework and governance; Environmental.

In the current case, it may be assumed that socio-political risk is not an issue for the continuation of project benefits, as Vietnam is in general a very stable country with very low socio-political risk. The project activities

are in line with communities' needs, and are beneficial for both the local communities and the governmental bodies. Due to intrinsic difficulties in communicating project activities without generating unnecessary alarm, there may be the perception from the public that the project progresses are not sufficiently effective to reduce the risk associated with dioxin contamination. A communication impact assessment conducted by the project also indicated that the target population benefited from direct communications and briefings, which explained the situation and remedies to local residents.

On the financial side, the project indeed increased the sustainability of actions aimed at remediating dioxin contaminated hotspot, by integrating its actions into governmental plans and institutions in charge of soil remediation (Committee 33 and Office 33 and related regulations), by providing grants for conducting remediation activities in Bien Hoa and Phu Cat, by leveraging a significant amount of funds for conducting the remediation in Da Nang (currently being carried out by USAID) and by promoting the co-financing from bilateral donors which were mainly dedicated to the sampling, monitoring and analytical testing of dioxin contaminated soil. In the coming years, after project closure, at least the activities in Bien Hoa and Da Nang will continue, thanks to the substantial amount of funds and technical assistance provided by USAID and by the Vietnamese government (MOD). There may be however a financial risk affecting the continuation of some monitoring activities: it seems that currently there are no resources for the implementation of the monitoring plan prepared by the Czech embassy although equipment for monitoring activities have been already delivered by the Czech project. As monitoring is a key issue for the continuation of project benefit, any effort should be paid by the Vietnamese government to ensure that the resources made available by bilateral donors are not lost.

On this side, information was provided concerning the DONRE of Dong Nai, which will continue the monitoring outside the Bien Hoa airbase.

As already stated in other part of this reports, as the country ownership of this project is very high, it may be also affirmed that consequently the institutional and governmental sustainability are high. There is however room for improvement in this area in the coordination between key Ministries (MOD and MONRE) and donors, to ensure that the remediation of contaminated military site is carried out following the environmental regulation established by MONRE, and to ensure that risks and benefits are properly and timely communicated to the impacted population.

The environmental sustainability is instead a very sensitive aspect to be considered. On the side of environmental sustainability, the 3 sites have very different issues. For Da Nang, the main issue may be to ensure that environmental monitoring of the activities as well as a proper mass balance of the dioxin destruction are carried out, independently supervised, and communicated. Indeed, very scarce information is provided under the USAID website and the local institution did not receive enough information for understanding the benefits and the impact of the technology. In the absence of a proper monitoring and supervision program, the effectiveness - ad therefore the sustainability - of dioxin destruction activities is questionable. For Bien Hoa, the key issue is the maintenance of the containment infrastructures. It should be pointed out that the containment infrastructures in Bien Hoa are mainly dedicated to the containment of solid transport of runoff sediment: for this reason, catchment ditches, barriers and basins have been established in an overall design, which aims at preventing the re-suspension and spreading of sediment contaminated by dioxin out of the airbase boundaries. The containment infrastructures are therefore hydraulic infrastructures, and as such these infrastructures need to be periodically maintained. More specifically, to ensure sustainability of Bien Hoa containment infrastructures, a management plan for removing grass, shrubs, sediment from the channels, basins and ditches should be funded and implemented; the material removed from the infrastructures should be properly tested for dioxin content, disposal or landfill; a plan for monitoring sediment flowing out from the airbase should be also drafted, funded and implemented; a plan for maintaining the integrity of infrastructures should also be funded and implemented. For Phu Cat, the environmental sustainability is ensured if a monitoring plan aimed at checking the integrity of the landfill is established. The landfill is already equipped with monitoring wells and a leakage well. Therefore, the only need is to periodically perform analysis of the water and sediment in the leakage and water monitoring well surrounding the landfill to verify that the level of dioxin contamination in these wells is low and stable with time.

Based on the above, sustainability rating of the project can be summarized as from the sustainability table below:

Sustainability component	Comments	Risk Level (Low, Moderate, High)
Financial	Although outstanding bilateral financial resources have been allocated for the continuation of remediation activities at Da Nang and Bien Hoa, there is the risk that the needs are underestimated. From the interviews and documentary analysis came out that resources for monitoring activities are scarce or not properly managed.	Moderate
Socio-political	Vietnam is a very stable country. The project is in line with the needs of communities, central and local government.	Low
Institutional framework and governance	The project was very well integrated with the governmental structures in charge of the remediation of dioxin contamination (Committee 33 - Office 33). This will facilitate sustainability of actions after project end. Limited concerns remain on the coordination with MOD and the donors.	Low
Environmental	There is the need to ensure a proper monitoring at all the three sites; there is the need to maintain periodically the hydraulic barriers in Bien Hoa to ensure their functionality. A better information on the effectiveness of the Da Nang remediation is necessary.	Moderate

7.3.6. Impact: amount of PCDD/F destroyed or contained.

PCDD/F destruction targets and indicators. In the original project document, it was established as a target for component 1 that "As a result of the GEF-project and leveraged funds / activities, all contaminated soil at concentrations greater than 1,000ppt and sediment at concentrations greater than 150ppt will have been treated adequately and residual contamination safely land-filled, and thereby 1,736 g I-TEQ dioxin release will be avoided: at Bien Hoa by the end of 2010; at Da Nang by the end of 2012; and at Phu Cat by the end of 2011."

At inception report, however this target was modified as following: "As a base target, an overall level of 1,700 g I-TEQ is recommended as a containment/remediation target such that this amount is eliminated as a near term ecological health threat and the amount actually eliminated (destroyed) be 1,000 g I-TEQ, all at Da Nang."

Based on this refined target, it is understood that out of the 1,700 g I-TEQ to be destroyed or contained, a target of 1,000 need to be actually eliminated by the ISTD destruction technology implemented in Da Nang, and the remaining 700 g/TEq would be either destroyed or contained in Bien Hoa and Phu Cat.

Amount of PCDD/F contained or destroyed. The project was successful in building infrastructures for containing the release of PCDD/F from the three hotspots (Phu Cat, Bien Hoa and Da Nang) to the environment, by means of the following actions:

- 3. Construction of an hydraulic barrier to prevent transport of PCDD/F contaminated soil and sediment by surface runoff following heavy rains events in Bien Hoa (completed in September 2013 after project mid-term evaluation)
- 4. Establishment of a safe landfills containing around 7500 m³) of highly PCDD/F contaminated soil excavated from contaminated areas of the Phu Cat air base (completed in 2012, before project midterm evaluation);
- 5. In Da Nang, the USAID intervention is being remediating a large amount of PCDD/F contaminated soil by means of on site thermal destruction. The USAID intervention in Da Nang is is currently being undertaken independently with USAID and MOD resources under a bilateral US-Vietnam cooperation, mostly under the coordination of MOD.
- 6. Concerning the effectiveness of these interventions, although there is monitoring information collated and made available under the project, there were no systematic attempts to estimate the amount of avoided PCDD/F release in the environment obtained by means of the above infrastructures.
- 7. Therefore, notwithstanding the successful implementation of containment measures, a significant uncertainty in the quantity of avoided PCDD/F release to the environment remains. This is partially due to the difficulty to measuring the effectiveness of some of the technologies adopted: for instance, in the Bien Hoa case, the containment infrastructures are mostly addressed at preventing the spreading of PCDD/F through adjective transport of sediment during runoff caused by heavy rainfall episodes: an estimation of the PCDD/F release prevented would be theoretically possible only by comparing the current amount of contaminated sediment transported before and after the implementation of the containment barriers. As the hydraulic barrier have been only recently completed, the measurement of the effectiveness of these barriers will need to be assessed after project end, by means of measurement of solid transport of sediment and determination of its PCDD/F contamination.
- 8. For Da Nang, as the remediation is currently being carried out by USAID, the only information on the progress of the remediation is the size of the pile being remediated. The USAID website does not contain either information on the PCDD/F content of soil under treatment, or information on the PCDD/F concentration in the exhaust gas at the stack and in the activated carbon filters.
- 9. Theoretically, more precise estimates of the amount of PCDD/F contained should have been available for Phu Cat, as the amount of soil contained in the landfill is known (7500 m³). Unfortunately, even for Phu Cat there is no precise information related to the contamination level of the soil stockpiled in the landfill.
- 10. Some very approximate estimation on the PCDD/F release prevented was therefore attempted within the evaluation exercise on the basis of general information made available under the project. These estimations are carried out with the only purpose to introduce a semi-quantitative indication of the effectiveness of the project in term of reduction of exposure to PCDD/F. As a general recommendation, a proper soil sampling and analysis plan and an environmental assessment aimed at a more precise quantification of this aspect should be implemented and sustained with governmental resources after project end.

Based on the little information available (1), the following estimates can be attempted:

- Pacer Ivy area in Bien Hoa: for Pacer Ivy, two scenarios can be assumed related to the containment of PCDD/F.
- In scenario 1, the average amount of dioxin existing in the first meter of soil is considered. Data available from the final "Comprehensive report" are as following:

	Average	80 th percentile value
	(PPT TEq)	(PPT TEq)
Office 33 2009	2780 (11 values)	1554
Office33/Hatfield 2010	2650 (30 values)	2188
Office 33/UNDP 2011	1706 (38 values)	1637

- Assuming a contaminated layer of an average depth of 1 m of soil, and considering that the amount of area under control by means of hydraulic barrier is in the order of around 7.5 ha (the extension of the whole Pacer Ivy area is calculated in 115,000 m²), the amount of PCDD/F currently being prevented to enter the environment thank to the hydraulic barrier in Pacer Ivy may be very preliminarily estimated in 179 to 291 gTEq (from 1706 ppt to 2780 ppt TEq x 75,000 m2 x 1 m x 1.4 t/m3 / 1e⁶) This amount only includes the soil contaminated in the area south-west to the runaway, but does not include contaminated sediment possibly mobilized from the runaway. In addition, this estimate is based on an assumption of 100% effectiveness of the hydraulic barrier, which need to be demonstrated.
- In scenario 2, only PCDD/F in the first 30 cm are considered as being contained by the infrastructures, as indeed these are aimed mostly at preventing the mobilisation of contaminated soil by rainfall runoff. Based on data from (Comprehensive report), the top layer of soil is the most contaminated, therefore this scenario consist in a much higher estimate (see picture below). Based on this scenario, only data related to the first 30cm of soil considered (from 32608 ppt to 116000 ppt TEq x 75,000 m2 x 0.3 m x 1.4 t/m3 / 1e6 = 180 g TE.) = 1027 to 3690 gTEq



- The containment infrastructures implemented to control the runoff to and from the Pacer Ivy area includes also berms intended designed to contain the sediment of the lakes located therein. The estimated area of the Pacer Ivy lakes is 35,000 m2, with a depth of the sediment calculated in 0.4 m. The average concentration of the sediment is 2850 ppt. Therefore, the amount of PCDD/F contained in the Pacer Ivy lakes may be calculated as 36 g I-TEQ (3500m² x 0.4m x 2850ppt x 1g/g / 1x10⁻⁶)
- Under the project, and additional amount of 2400 m3 of contaminated soil were excavated and stockpiled. There are no available information on the contamination level of the stockpiled soil. Based

on the average contamination level used for the Pacer Ivy area, the amount of dioxin stockpiled is in the order of 8.6 gTEq.

- Other contaminated areas in Bien Hoa: before the project, around 94000 m³ of contaminated soil from the Z1 area has been excavated and placed on an impermeable platform. This amount was not included in the calculation as it would not be attributable to the project. However this is a potential source of dioxin which needs to be kept under control.
- Phu Cat landfill: around 7500 m3 of PCDD/F contaminated soil were placed in the safe landfill. It may
 be assumed that the average concentration of the soil currently stored in the landfill correspond to the
 average concentration of the highly contaminated area in Phu Cat, namely the storage area used for
 storing and loading pesticides³ Assuming an average concentration of 37.400 ppt the amount of
 PCDD/F prevented to enter the environment may be therefore estimated in around 395 gTE.

Therefore, summing up the average PCDD/F currently contained in Bien Hoa and Phu Cat, an overall amount with a lower bound estimates of 610g I-TEQ and an upper bound estimates of 4000 g I-TEq have been contained by actions directly carried out with project funds, whether an additional unknown amount has been contained by project implemented and funded by the government before project implementation. Again, this is a very rough estimated based on the best data available, which need to be confirmed by a proper monitoring plan and environmental assessment to be carried out, and which assumes a 100% containment effectiveness for the hydraulic barriers in Bien Hoa.

As far as the 1,000 g I-TEQ to be destroyed by implementing the technology in Da Nang, it has to be remembered that although the Da Nang project may be considered as a resource initially leveraged under the UNDP project and with the coordination of Office 33, currently the project in Da Nang is being running independently by USAID under the coordination of MOD; with Office 33 only being informed of the status of the activities. Being a separate activity, the evaluator has no responsibility to carry out an evaluation of the activities performed therein, and indeed no information additional to what is already publicly available related to the effectiveness of the remediation in Da Nang was made available to the evaluator.

Therefore, there are no quantitative information on the effectiveness of the technology and the amount of PCDD/F destroyed. The consideration on the effectiveness of the technology adopted reported in the Midterm Evaluation Report were submitted to the USAID staff in charge of operating the technology, however no feedback was provided on these considerations, which therefore are still valid.

Based on the information provided in the USAID website⁴, 45000 m³ of PCDD/F contaminated soil have been currently excavated and placed in the pile being remediated with the in situ thermal desorption technologies in Da Nang. In the USAID website there are no information available on the average amount of PCDD/F contamination of the soil under remediation. The average temperature of the pile in October (last bulletin available) was 278°C. In the view of the evaluator that this temperature is too low for resulting in any destruction of PCDD/F, as PCDD/F thermal destruction would require a much higher temperature (usually more than 1000°C) followed by rapid quenching to prevent "de-novo" formation of PCDD/F. This temperature is even too low for the simple mobilization of TCDD from the pile, as the boiling point of the TCDD is 412 °C. The assessment of the technology effectiveness in Da Nang - initially required as one of the core project indicators for component 1, but currently not anymore considered part of the project - would therefore require a careful measurement of the PCDD/F mass balance by means of frequent monitoring of PCDD/F mass released from the plant stack, by measurement the amount of PCDD/F adsorbed by the activated carbon columns, and by means of extensive characterisation of the residual contamination in the pile after the treatment.

³ A Report On Dioxin Contamination At Three Hotspots Of Bien Hoa, Da Nang And Phu Cat Airbases, Office of National Steering Committee 33, 2014.

⁴ http://www.usaid.gov/vietnam/environmental-remediation-dioxin-contamination-danang-airport-projectfrequently-asked-questions (accessed March 26, 2015)

Based on the above information, an amount of around 610 to 4000 gTE of PCDD/F may be considered as being currently contained under the project, preventing - as long as the containment infrastructures will be properly maintained - the exposure of the population surrounding the Bien Hoa and Phu Cat airbases areas, whilst there are currently no information available for the amount of PCDD/F destroyed in Da Nang.

Even in the case the lower bound estimates is considered for the evaluation, this is quite a huge amount of PCDD/F, comparable to the yearly emission from all sources of PCDD/F of a mid size country, representing a very large potential risk for the population and the environment if not properly controlled, and therefore requiring that the remediation / containment actions are sustained after project ends.

The containment will however need to be followed by a proper remediation plan to be designed and implemented at the site.

7.3.7. Impact: exposure reduction

Updated population estimates for the potential population at risk of dioxin exposure at Bien Hoa and Phu Cat Airbases were determined during the preparation of the "Evaluation of Dioxin Project Impact to Environment and People", from interviews with Ward and District leaders. Based on current estimates provided in the report, over 120,000 people residing in wards near Bien Hoa Airbase and 47,000 persons near Phu Cat Airbase are potential beneficiaries of reduced dioxin exposure from activities conducted under the Dioxin Project. To further reduce exposure to PCDD/F of this population it is key to sustain the effort aimed at raising awareness on the food-chain related risk, and to sustain access restriction to contaminated areas.

7.3.8. Impact: technology testing

The identification of suitable, cost effective technologies for the cleaning up of PCDD/F contaminated soil has a large potential impact well beyond the project boundaries.

In the first two years of project implementation, before midterm evaluation, a technology for the remediation of contaminated soil was tested. The midterm evaluation report included an assessment of the technology testing activity carried out on the MCD (Mechanic Chemical Destruction) as well as considerations regarding other technologies examined under the project for the remediation of contaminated soil.

The testing of MCD technology in Bien Hoa was successful although some uncertainties related to the capacity of MCD technology to achieve the required destruction goal at high concentration remained unresolved. It should be recalled here that the testing of the MCD technology, conducted in Bien Hoa in the late summer of 2012, envisages the treatment of 3 subsets of soil with different contamination levels based on the historical point analysis from two different site locations. The contamination level was initially classified as high (> 10,000 pg-TEQ/g), medium (between 2,000 and 10,000 pg-TEQ/g), and low (<2,000 pg-TEQ/g) but it was found largely underestimating the real contamination of the treated soil. The technology proved effective in bringing soil contamination level under to the cleanup target set at 1000 pgTe/g for most of the low and medium contaminated soil, but failed to achieve both the 1000pgTe/g cleanup target and the 15000pgTE/g (low POPs content) for the highly contaminated soil. The lower performance in treating highly contaminated soil was at least partially due to the fact that the plant was configured on the basis on initial specification of PCDD/F concentration in the soil which underestimated the real content of PCDD/F: for this reason further test of the technology is planned.

The on site thermal desorption technology is being implemented in Da Nang however no information on its actual effectiveness has been released yet. The only information currently released is the amount of contaminated soil under treatment (44000 m³) and the temperature in the pile achieved by the treatment, which on Nov 2013 was still in the order of 270°C.

Notwithstanding these uncertainties, the impact resulting from the testing and implementation of different technologies has to be considered high. The project, by demonstrating a PCDD/F destruction technology and establishing containment infrastructures and safe landfills, contributed significantly to the knowledge and the increased technological capacity of the relevant stakeholders for problem analysis and remediation of dioxin contamination.

At local level, training on remediation technologies and workshops on the hot spot action plans have been performed; the results of the technology testing has been discussed by experts from different institutions, thus ensuring a good circulation of technical know-how and information, which eventually resulted in a substantial technology transfer on the issue of remediation of dioxin hotspots.

As a result of mid-term evaluation, it was recommended to "carry out additional tests aimed at a better understanding of the mass balance of the mechano-chemical process and at verifying the effective capability of the technology to remediate high contaminated soil should be carried out under this GEF project". These additional demonstrations have been conducted not only for the mechano-chemical process, but also for a thermal desorption technology and for biological- chemical destruction process. The result of the testing has been presented in the closure workshop of the project, held in Hanoi on March 18, 2015. Two independent technical evaluators (one international expert and one national expert) where recruited to assess the tests. In spite of some differences on data interpretation between the two technical evaluators, emerging from their speeches and their report, the main conclusions of their evaluation was as following:

- 1. both the thermal desorption technology (MCS) and the mechano-chemical technology (EDL) are suitable technologies for the remediation of PCDD/F contaminated soil in Vietnam
- 2. the bio-remediation technology still needs further testing to demonstrate its applicability for the remediation of contaminated soil.

In summary, the exercise of technology testing was an outstanding result of the projects, as it made available large amount of data concerning the effectiveness of PCDD/F treatment technologies. These data will be extremely useful for undertaking remediation of contaminated soil in Vietnam and in other countries.





Figure 1. Photo of the containment wall taken during the su and channel in Bien Hoa with geo-positioning (November 10, 2014)



Figure 2. Photo of the containment wall taken during the su and channel in Bien Hoa with geo-positioning (November 10, 2014)



Figure 3: Ponds in the vicinity of the SW boundary of the Bien Hoa airbase and its positioning (Nov 10, 2014)



Figure 4: A small dam built to ensure settling of sediment located in the vicinity of the SW boundary of the Bien Hoa airbase. (Nov 10, 2014)



Figure 5: The outlet at the exit of the runoff containment channels. Thank to the existence of the channel network developed under the project, the water collected and exiting from this outlet does not flow over the contaminated areas (Nov 10, 2014)

8. CONCLUSIONS, RECOMMENDATIONS & LESSONS

8.1.ACTIONS TO FOLLOW UP OR REINFORCE INITIAL BENEFITS FROM THE PROJECT

8.1.1. Actions aimed at ensuring sustainability of project infrastructures and monitoring.

Based on the outcomes of site visit and interviews, there are some risks for the sustainability and continuation of project benefits which should be properly addressed. As the project is completed, these recommendations are intended for the handing over step of the project to the government of Vietnam, and / or future partners

First of all, there is the need to ensure the maintenance of infrastructures for the containment of dioxin contamination. Although the containment measures implemented by the project are temporary, the time necessary for a complete decontamination of the site may be long: therefore proper efforts to ensure the functionality of these infrastructures are a key requirements for securing the continuation of project benefits.

In Bien Hoa the containment infrastructures are mostly hydraulic infrastructures aimed at preventing rainfall runoff water from flowing through the most contaminates area (the Pacer Ivy are), and small dams and catchments aimed at facilitating the settling of contaminated sediment whilst allowing water - purified from the sediment - to leave the area. The main risk for this infrastructure is the clogging of the channels due to deposition transportation of branches, leaves and bushes, and the gradual filling of the catchment basins due to the solid transport with water runoff. The channels should be cleaned after each rainfall period - at least 3 or 4 times per years; the level of sedimentation in the catchments should instead be measured regularly, and once a certain level is reached, the bottom sediment should be dragged out, measured for the content of PCDD/F, and stored - landfilled.

In Phu Cat, as the landfills is equipped with a system for sampling the leakage, periodical sampling and analysis of the leakage should be carried out. An increase in the dioxin level of the leakage (if any) should be interpreted as a symptom of breaking of one or more of the landfill impermeable layer, and in this case, confirmatory analysis and an emergency plan should be conducted. The sampling of the leakage is the most immediate measure for checking the integrity of the landfill: due to the extremely low mobility of PCDDF in soil, PCDD concentration in groundwater could build up very slowly after a breaking in the landfill and therefore, although necessary, it is not the most effective way to monitor landfill integrity.

Based on interviews, it seems that there may be a discontinuity on environmental sampling and analysis activity, due mainly to management issues and limitation of funds. This shortcoming should be addressed by the definition of new monitoring plan and the establishing of new partnerships if necessary. In this regard it should however mentioned that the DONRE of Dong Nai is implementing, starting from the year 2015, a specific activity aimed at the environmental monitoring outside the Bien Hoa airbase. If it is so, the sustainability issue only concerns monitoring inside the airbases.

8.1.2. Actions aimed at ensuring the correct flow of information among partners.

One of the main project issues was the limited coordination between MONRE / Office 33 and USAID. As the Bien Hoa site is currently in the stage of handing over to USAID which will take the lead on future activities on the site, more focused effort should be dedicated to the collation and handing over of monitoring data and infrastructure design to MOD and USAID. Under the project some workshops were already held with the purpose to exchange information, however, based on the two meetings carried out by the evaluator with the USAID personnel in charge of Environmental Assessment and remediation activity, the lacking of exchanging of information emerged quite clearly.

Similarly, based on interviews with local stakeholders, emerged clearly that the information on the implementation of activities at Da Nang are insufficient. The USAID website on the Danang project provide very basic summaries on the activities being carried out, without any information on the monitoring data, dioxin level of the contaminated soil, Although is understandable that this kind of information need to be consolidated before its release, nevertheless the evaluator consider the level of information provided under the website not sufficient for communicating the remediation status and its benefits.

In addition, a specific action should be undertaken by GoV to ensure that the issues reported by the Czech government on the implementation of the monitoring plan are solved, and the sustainability of monitoring plans ensured.



Figure 6: One of the monitoring wells provided by the Czech Republic cooperation and its position (Nov. 10, 2014)

8.2.BEST AND WORST PRACTICES IN ADDRESSING ISSUES RELATING TO RELEVANCE, PERFORMANCE AND SUCCESS

Again, it has to point out that addressing dioxin contamination is indubitably one of the most demanding activities from the point of view of environmental engineering. Worldwide, there are very few cases were dioxin contaminated soil has been effectively decontaminated, and in the large majority of cases the only viable solution has been landfilled: see for instance the case of Seveso. As pointed out by US EPA, *"Remediation technologies for the cleanup of dioxin-contaminated soils and sediments are still being developed, and many of the accepted techniques rely on thermal destruction, though physical, chemical and biological technologies show promise." (http://clu-in.org/contaminantfocus/default.focus/sec/dioxins/cat/overview/ last updated on Friday, August 1, 2014). The*

If we couple this difficulty with the fact that the three hotspots in Vietnam are by far the largest and heaviest sites contaminated by dioxin in the world, we can easily understand how huge has been the challenge.

The project should be therefore evaluated in the light of this challenge. It is evident that the project is unique and brought a number of global and local environmental benefits:

- 1. The spreading of PCDD/F to the environment from the Bien Hoa and Phu Cat sites was minimized and the Da Nang site is currently under remediation by the USAID project. The amount of dioxin contained in the two hotspot of Bien Hoa and Phu Cat has been conservatively estimated, based on the available soil monitoring data around 620gTEq against the 730 estimated at the beginning of the project. This is an enormous amount of Dioxin, which is comparable to overall yearly emission in the atmosphere of a midsize country. In addition, although the remediation activity in Da Nang is not any more part of the project (being carried out independently by USAID under MOD coordination), in Da Nang 44000 m³ of contaminated soil are currently under treatment.
- 2. As already pointed out at mid-term, the project, which PMU was established at the Office 33,was effective in collecting and systematizing the documentation generated by the governments and international donors in the preceding years, and to the expand the database of environmental monitoring. By providing technical and financial support to the Office 33 the project acted as "catalyst" of the site characterization and cleanup efforts being carried out by the government and the international donors. This is well acknowledged in a report drafted by USAID (2), which stated "UNDP's program also provides for an overarching umbrella framework that facilitates donor coordination among those working on environmental remediation of dioxin in Vietnam."
- 3. Although did not solve all the uncertainties related to the effectiveness of the treatment, the technology testing of the three technologies (mechano-chemical destruction, thermal desorption and bioremediation) carried out with the project technical and financial support represents a reference for the treatment of soil contaminated by dioxin and other POPs which expanded the available choices of disposal technologies for future treatment of POPs contaminated soil.
- 4. Under the project, important national and international initiatives for the exchange of know-how on the management of dioxin contaminated soil have been established. See for instance the "International Workshop on "Dioxin/POPs Pollution Assessment and Remediation in Viet Nam" and the newsletters "Environmental Remediation of Dioxin Contaminated Hotspots in Vietnam".
- 5. While international communications were made highly relevant and comprehensive, the need from the local population on continuous communication about their situation and risk reduction should be further addressed, using materials, tools and good practices produced by the project.

Obviously, due to the complexity of the project, there were difficulties and shortcomings, which however must be considered minor compared to the benefit achieved so far:

- 1. Interviews carried out in the course of the terminal evaluation confirmed some of the difficulties in communication, mostly between local institution and central institutions; coordination between MOD and MONRE especially on the side of land use of the hotspot after remediation (partially solved with two joint conferences on land use); information of some of the exposed population group, and specifically of the troops inside the airbase concerning their level of exposure. Although not anymore under the project responsibility, the level of detail of information released by the Da Nang remediation activity is insufficient.
- 2. Surprisingly, an objective risk-assessment approach for the before and after quantification of risk was not envisaged in the project design and not seriously attempted during project implementation. Even because of the limited scope of the TOR, the study assigned to an external consultant to carry out to a project impact evaluation resulted in interviews and further collection of existing data and did not provide quantitative information on the project impact.
- 3. The project seems to have lost some momentum in the second stage of implementation, after mid-term. Some activities like the completion of testing of cleanup technologies, monitoring, and drafting of guidance documents were still under completion when the terminal evaluation started. Partially this can be attributed to a progressive shifting of the team's effort toward new activities, whilst the approaching of the project toward its closure stage was requiring an increasing level of effort on both on the administrative and technical side.
- 4. As already pointed out in this document, the lacking of a sound maintenance and monitoring plan for the hydraulic infrastructures in Bien Hoa and the landfill in Phu Cat represent the highest risk to be addressed with the effort of all the project stakeholders and the institutions which will be in charge of these sites after project closure.

8.3. PROPOSALS FOR FUTURE DIRECTIONS UNDERLINING MAIN OBJECTIVES

The project should be considered as successfully concluded, and the shortcomings identified, some of which indeed not attributable to the project itself, could be easily resolved with limited additional effort to be sustained by the beneficiaries.

One of the aspects that should be considered for future activities in the field of POPs, emerging as one of the lesson from this project, is to establish a *sound risk-based approach for the management of contaminated sites*. Risk based remediation is indeed the only approach which can help the quantification of cleanup target, design of cleanup activities, assessing its effectiveness, and identifying additional countermeasures. Other scientific tools - like epidemiological surveys - can only assess the residual risk "ex-post", when is too late.

This has been one of the outcome the GEF/UNDP project "Building Capacity to Eliminate POPs Pesticides Stockpiles" and is one of the core parts of the recently endorsed GEF/UNDP project "Vietnam POPS and Sound Harmful Chemicals Management Project". Considering that the issue of contaminated sites in Vietnam is very serious, the implementation of a risk based approach, integrated with monitoring activities, and should be properly streamlined in the national regulation, official guidance, and demonstration. It is likely and indeed should be advisable that further support is provided to the country on this area.

A second aspect concerns the cleanup technology issue. Beside the gigantic needs of the cleanup of dioxin hotspots, there are in Vietnam hundreds of small sites contaminated by POPs or other chemicals that would benefit from the *existence of medium/small scale cleanup facilities*. There are consolidated technologies (like the *indirect thermal desorption*) which proved effective in cleaning up soil contaminated by PCBs (see for instance the GEF/WB project "China PCB Management and Disposal Demonstration project"), PCDD/F, pesticides, hydrocarbons. Even the MCD technology may appear promising for soil contaminated by PCDD/F at a level <30,000 ppt TEQ provided that it is improved in term of air pollution control system and that it is integrated with sanitary landfills where the treated soil, which after treatment may still contain PCDD/F in the

range of 100-1000 ppt TeQ, will be contained. The limitation of the technology to 30,000 ppt TEQ, as confirmed by the vendor itself, makes that technology less suitable for other chlorinated POPs like PCBs considering that - assuming an equivalent level of chlorination - PCB contaminated soil need to be treated with a destruction technology only when their concentration exceed 50,000,000 ppt. (50 ppm)." It seems that in Vietnam a *domestic capacity for site cleanup* has not yet been established. The establishment of *medium/small scale cleanup facilities based on consolidated technologies in Vietnam could be very beneficial for the country, and could represent an outstanding development opportunity.*

A third aspect that should be strengthened is environmental monitoring, and more specifically, the capacity to properly design and carry out *sampling plans* .aimed at characterizing the level of contamination of various environmental media and the release of dioxin in the environment. Thank to the joint efforts of the government of Vietnam and its partners like the bilateral donors mentioned in this document, there are now in Vietnam a number of laboratories which are equipped with up to date instrumentation for carrying out analysis of PCDD/F contaminated media (soil, plants, biota, and air). However one of the project lessons was that the analytical capacity is not properly integrated with a sound environmental sampling capacity. Environmental sampling indeed is very often the true bottleneck in any successful environmental monitoring and should be properly implemented to i. minimize sampling error and variability, ii. Ensure sampling significance, and iii. Minimize laboratory effort by the use of "smart" sampling strategies. This is a further area of development under which additional efforts would be very beneficial to ensure that a domestic capacity can be timely deployed when needed, considering also its key role in case of emergency response.

Last but not least, *the communication of environmental monitoring data* needs also to be strengthened. Monitoring and communication goes obviously hand in hand, as in the end the population is the key beneficiary of any monitoring activity. Nevertheless, the proper communication of environmental data is a sensitive issue and need to be properly designed, prepared, and undertaken. Environmental data should be communicated in a way which is comprehensible, useful, and timely, and which is target - specific. Unnecessarily alarming communication should be avoided, however any time a risk is identified it should be timely communicated together with the explanation related to all the necessary countermeasures to be adopted. This is for sure an additional area under which further efforts need to be carried out.

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10.ANNEXES

10.1. LIST OF TRAININGS EVENTS CARRIED OUT UNDER THE PROJECT

List of Dioxin project's training course and workshops, (June, 2013 – November, 2014). Source: PMU

No	Training course/workshops		Locati	on	Date	Participants (Number & Agencies)
01	Workshop on "Improving knowledge of government officers on preventing exposure to Agent Orange/dioxin	Hội thảo truyền thông nâng cao nhận thức về phòng tránh phơi nhiễm chất da cam/dioxin cho cấp quản lý tại Thành phố Biên Hòa	Bien City	Hoa	Oct 2013	49 participants From: Office 33, Dong Nai, Bien Hoa People's Committee, Department of Health Care, Department of Labor, Invalid and Social Affairs, Department of Education, Department of Environment and Natural Resources, Reg 935, Bien Hoa VAVA, representatives from 4 communities located surrounding Bien Hoa Airbase and a fews residents and Dong Nai Press
02	Training workshop on communication skill of field collaborators on preventing exposure to Agent Orange/Dioxin in communities	Hội thảo tập huấn kỹ năng truyền thông cho cộng tác viên về dự phòng phơi nhiễm chất da cam/dioxin trong cộng đồng	Bien City	Hoa	Oct 2013	20 officials from 4 communities (Tan Phong, Buu Long, Quang Vinh, Trung Dung) surrounding Bien Hoa Airbase
03	Model Communication programme on "Agent Orange/Dioxin and methods to prevent exposure"	Chương trình truyền thông mẫu"tuyên truyền về chất da cam/dioxin và các cách phòng chống phoi nhiễm chất da cam/dioxin	Bien City	Hoa	Oct 2013	~ 60 residents living in Tan Phong Community (most of Bien hoa Airbase is in this community)
04	Training workshop on communication skill of teachers on preventing exposure to Agent Orange/Dioxin in schools	Hội thảo tập huấn kỹ năng truyền thông cho giáo viên về dự phòng phơi nhiễm chất da cam/dioxin trong trường học	Bien City	Hoa	Oct 2013	56 teachers from 3 secondary schools in 4 communities surrounding Bien Hoa Airbases
05	Communicatin programe for students to provide knowledge on Agent Orange/Dioxin and methods to prevent exposure	Chương trình truyền thông Bien Hoa City cho học sinh trung học cơ sở về kiến thức phòng chống phơi nhiễm Chất Da cam/Dioxin			Oct 2013	~ 200 students in Hung Vuong secondary school located in Quang Vinh Community
06	International Workshop on "Sharing lessons - learned: Dioxin/POPs Pollution Assessment and Remediation in Vietnam"	Hội thảo"Chia sẻ và học hỏi kinh nghiệm về đánh giá và xử lý ô nhiễm Dioxin/POPs ở Việt nam"	Da City	Nang	Dec 2013	~ 80 participants International participants: USEPA, USAID, Czech Re Thailand Pollution Control Department, Malaysia Ministry of Environment, Taiwan Environmental Protection Administration, Taiwan National Central University. Other Taiwan Universities, Kanazawa University – Japan, Umeå University – Sweden, some companies (HPC, ESS), UNDP National Participants: From MONRE: Office 33,

					Department of Planning, Dioxin Lab (VEA), Department of International Cooperation <u>From MOD</u> : Military Science Agency, Department of Air Force and Air Defence, Centre of Environment Remediation Technology, Chemistry Command, Reg 372, VRTC <u>Others:</u> MPI, MOF, Dong Nai DONRE, Da Nang DONRE, VNUH, National consultants and Press/
07	Workshop on "Announcement of Additional Assessment on Dioxin Contamination Status in Bien Hoa Airbase and Recommendations for its Landuse Plan"	Hội thảo "Công bố kết quả đánh giá bổ sung thực trạng ô nhiễm dioxin và kiến nghị kế hoạch sử dụng đất tại sân bay Biên Hòa"	Hanoi	March 2014	~45 participants International Organizations: US Embassy, USAID, CDM Smith, Czech Republic, UNDP From MOD: VRTC, Reg. 935, Department of Air Force and Air Defence, Centre of Environment Remediation Technology, Institutes of Military Sciences and Technologies Others: Office 33, Dong Nai DONRE, National Consultants, Presses
08	Workshop "National investigation on dioxin level in various emission sources and in environment"	Hội thảo "Điều tra quốc gia về mức dioxin từ các nguồn phát thải và trong môi trường"	Hanoi	April 2014	 ~ 70 participants <u>International Organizations:</u> UNDP <u>MONRE:</u> VEA, Office 33, Department of International Cooperation, Department of Planning, Department of Finance, Pollution Control Agency, <u>Other Ministries</u>: VRTC (MOD), Department of Military Sciences (MOD), Chemistry Command (MOD), Ministry of Industry and Trade, MPI, MOF, Vietnam National University, <u>Local Participants:</u> Dong Nai, Da Nang, Bac Ninh, Hai Duong, Hai Phong DONREs Enterprises where samples were collected (~ 14 participants) And National consultants
09	Workshop on " Dioxin contamination in Bien Hoa Airbase – Status & Plan for future works"	Hội thảo "Đánh giá thực trạng ô nhiễm Dioxin ở sân bay Biên Hòa – Những việc cần làm"	Bien Hoa City	Oct 2014	 ~ 65 participants <u>International Participants:</u> US Embassy, UNDP, USAID/CDM Smith <u>MONRE:</u> Office 33, Department of Planning, Department of Personnel and Organization, Pollution Control Agency, <u>MOD:</u> Department of Planning and Investment , Department of Military Sciences, Department of Foreign relations, Centre of Environment Remediation Technology, Institutes of Military Sciences and Technologies, Chemistry Command, Reg.925.

		Other ministries: MPI, MFA
		Local institutions: Da Nang DONRE, Dong Nai DONRE, Dong Nai, MOH
		Others: some companies concerning dioxin treatment in Vietnam, and press

10.2. AGENDA OF THE EVALUATION MISSION IN VIETNAM

Date	Persons / Institution met	location	Meeting purposes / notes.
Nov-03	Arrival in Hanoi of the international expert		
	Meeting at UNDP office in Hanoi, (15.30 - 17.00)	Hanoi	Briefing of the evaluation. Discussion on the mission agenda.
Nov-04	Meeting with Mr Le Ke Son, former project director.	Hanoi	Discussion on the project in general, with some specific highlights on the situation of Bien Hoa, technologies, coordination in Da Nang.
	Meeting with Pham Ngoc Can, PMU representative.		Discussion on the performance of Da Nang plant, the monitoring carried out under Czech co-financing, effectiveness of the containment infrastructures in Bien Hoa.
	Meeting with project expert Mr. Tu Bin Minh		General discussion on the situation of the guidance documents on technology selection and standards being prepared by the University.
	Meeting with the Institute of Social Science (Ms. Tran Minh Hang)		General discussion on communication and raising awareness activities.
	Meeting with the Ministry of Environment (Mr. Tram Lam Hao)		Discussion on the proposed standards related to PCDD/F emission from industrial plants
Nov. 5	Meeting at USAID with USAID expert (Ms. Choe) and US Embassy representatives	Hanoi	The evaluator introduced the project and the evaluation scope. No information received from USAID.
	Meeting at the Czech embassy with Mr. Milan,	Hanoi	Mr. Milan informed the evaluator about the difficulties related to the implementation of the Czech monitoring plan.
Nov. 6	Meeting at PMU with dr. Minh, technology expert.	Hanoi	Discussion on technology evaluation, outcome of the Czech republic project, and in general on the effectiveness of the project.

	Meetinwg with the Science Department of the Ministry of Defence, at PMU	Hanoi	Discussion on the sustainability of monitoring activities, which will fall under the responsibility of MOD.
Nov-07	Visit ad Da Nang (Da Nang	The visit to the Da Nang site was cancelled due to permitting issues. Only a short visit around the pile was allowed.
	Visit at DONRE Da Nang	Da Nang	Discussion on the availability of information on the status of Da Nang remediation and on monitoring outcomes.
Nov-10	Visit at Bien Hoa in the morning (from 9.00 to 10.30)	Dong Nai	90 minutes of visit to the Bien Hoa sites were allowed. Short meeting with the representatives of Bien Hoa staff before and after the visit.
	10h00 - 11h00: Meeting with Vice Director of Dong Nai DONRE. Mr. Tuấn (091 857 3063) - DONRE officer, Ms. Lieu (093 759 9086)	Dong Nai	General discussion on the availability of monitoring information to assess the effectiveness of containment operation.
	15h15 - 16h15: Meeting with Dr. Nguyen Xuan Hung, Director of Bien Hoa Health Centre	Dong Nai	General discussion on compensation issues for military and non-military staff exposed to dioxin.
	Xuân Hùng (090 3615 666)		
Nov-11	Meeting at Ministry of Finance	Hanoi	Discussion on the modality of financial management and supervision as ensured by MOF.

10.3. AGENDA OF THE CLOSING WORKSHOP AND TECHNOLOGY EVALUATION WORKSHOP

Thursday 19th March, 2015

At Fortuna Hotel, 6 Lang Ha, Thanh Cong, Ba Dinh, Ha Noi

Time	Content	Responsible person			
I. CLOSING WORKSHOP					
08:30 - 09:00	Registration	Office 33/Dioxin Project			
09:00 - 09:10	Introduction of Participants	International Relations Division of Office 33			

09:10 - 09:30	Opening Remark	Dr. Nguyen The Dong – General Director of Office 33 Mr. Bakhodir Burkhanov - UNDP Deputy	
		Country Director	
	Evaluation of Results of Implementing	Dr. Carlo Lupi,	
09:30 - 10:00	Dioxin Project	UNDP International Independent Evaluator	
10:00 - 10:30	Tea break		
	Support of Dioxin Project to	Asso. Prof. Dr. Le Ke Son,	
10:30 - 10:15	Development of legal framework on Dioxin Management in Viet Nam	National Project Director	
10:15 - 10:45	Agent Orange/Dioxin Contamination Treatment in Hotspots in Vietnam and remaining issues	Dr. Nguyen Van Minh	
		Dr. Nguyen The Dong	
11:15 – 12:00	Discussion and Conclusion	Asso. Prof. Dr. Le Ke Son	
		Mr. Bakhodir Burkhanov	
12:00	Lunch		
I. TECHNOLOG	Y DEMONSTRATION TECHNICAL WOI	RKSHOP	
13:30	Registration	Office 33/Dioxin Project	
14:00 – 14:15	Introduction of Participants	International Relations Division of Office 33	
14:15 – 14:30 Opening Remark		Dr. Nguyen The Dong – General Director of Office 33	
		UNDP Representative	
14:30 – 14:55	EDL's presentation	EDL Representative	
14:55 – 15:20	HPC's Presentation	HPC Representative	
15:20 – 15:45	TTI's presentation	TTI Representative	
15:45 – 16:00	Tea break		
16:00 – 16:25	Evaluation report by International Expert	Dr. Rick Cooke	

16:25 – 16:50	Evaluation report by National Expert	Dr. Nguyen Van Minh		
16:50 – 17:30	Discussion and Conclusion	Dr. Nguyen The Dong Asso. Prof. Dr. Le Ke Son UNDP Representative		

10.4. TERM OF REFERENCE FOR THE EVALUATION

10.4.1. INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support

-GEF financed projects are required to undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of the project "Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam" _PIM 3685

The essentials of the project to be evaluated are as follows:

Project Environmental Remediation of Dioxin Contaminated Hotspots in Viet Nam Title:					
GEF Project ID:	PIM 3685			<u>at endorsement</u>	at completion
	1 110 5085			<u>(Million US\$)</u>	<u>(Million US\$)</u>
UNDP		GEF			
Award/Project	00057593/00071224	financing:	4.977		
ID:					
Country:	Vietnam	IA/EA own:	450)	
Region:	Asia & Pacific	Government :	11.000		
Focal Area:	Chemicals/POPs	Other:	20.885		
FA Objectives,		Total co-			
(OP/SP):		financing:	32.330		
Executing		Total Project	60.648		
Agency:	Office 35/MONRE	Cost:	t:		
Other Partners		ProDoc Signature (date project			28/06/2010
involved:	MOD	began):			20/00/2010
		(Operation	nal)	Proposed:	Actual:
		Closing Da		January 2014	December 2014

10.4.2. PROJECT SUMMARY TABLE

OBJECTIVE AND SCOPE

The project was designed to minimize the disruption of ecosystems and health risks for people from environmental releases of TCDD (Tetra-chloro dibenzo-dioxin, aka dioxin) contaminated hotspots and contribute to the national broader goal, which is to overcome the consequences of toxic chemical used in the war in Vietnam.

The project has 3 following designed outcomes:

- 1. Dioxin in core hotspot areas (3 military airbase in Phu Cat, Bien Hoa, Da Nang) contained and remediated,
- 2. Land-use on and around hotspots eliminates risks and contributes to environmental recovery, and
- 3. Strengthened national regulations and institutional capacities.

The Project, which began in 2010 and will be completed in Dec 2014, achieved followings key results during its implementation:

- 1. Completion of the containment of high contaminated soil in Phu Cat airbase to a secured landfill, which eliminates impending risk of dioxin exposure to local residents in 2011;
- 2. Completion of a Master plan for dioxin remediation in Bien Hoa airbase and handed it over to Ministry of Defend (MOD), who is authorized for land use planning of Bien Hoa airbase in 2013;
- 3. Completion of Interim civil works to prevent the spreading of dioxin contamination in Bien Hoa Airbase to outside in 2014;
- Completion of the demonstration of a dioxin remediation technology (MCD) in Bien Hoa, which examine the feasibility of the technology to unique conditions of local dioxin contaminated soil in 2012;
- 5. Completion of baseline surveys to support for the establishment of proper instruments (national standard and regulation) to control dioxin emission and exposure in 2013 & 2014;
- 6. Undertaken communication activities in surrounding areas of Bien Hoa airbase in 2013, which focusing on 4 communes living nearby Bien Hoa airbase, to raise awareness on dioxin exposure;
- Undertaken the dissemination of Agent Orange/dioxin information in national events, international workshops and conferences, i.e. International Dioxin Conference in 2011, 2012, 2013 and 2014;
- 8. Undertaken further field contamination surveys :
 - Detailed soil survey for known contaminated sites were conducted to delineate the extent and depth of the contamination,
 - Dioxin contamination survey extended to other suspicious sites based on the local condition,
 - Co-contamination of soil with organic arsenic has been discovered that might affect the technology selection and final outcome of treated soil.

Several on-going activities at present will contribute further results at the end of the project such as (1)a guideline for principle technical steps/procedure for dioxin/Agent Orange treatment in Vietnam, which including principle guides for technology selection, evaluation, demonstration and practical application, (2)national report on industrial dioxin emission to environment, (3)report on further technology demonstration of 3 technologies, etc.

In addition to the GEF funded project, numbers of international assistances were developed and implemented on the Agent Orange/dioxin issues. The key development partners include United States,

Czech Republic, New Zealand, etc. These projects/contributions were implemented with close communication and collaboration to maximize the effectiveness of the intervention.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The main stakeholders in the evaluation process are UNDP Country Offices and relevant ministries involved in the project (Ministries of Natural Resources and Environment, Ministry of Defend) as well as the project implementing institutions and relevant parties.

The principal objective of the evaluation is to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

Taking into account that a mid-term evaluation of the project was conducted in July-August 2013, one of the main focus of the terminal evaluation is to review the project's progress from mid to final project time and to assess whether the project have addressed and duly responded to the concerns of the mid-term evaluation accepted by the management team(s).

The second main focus, as a terminal evaluation is to take a final, technical and independent look at the project and its results, provide ratings in accordance with the guidelines, and provide recommendations for the project closure on ensuring sustainability and on the replication approach of the project (through a summary of what elements in the project could be replicated and shared with other countries and/or what products/lessons can be scaled-up due to their applicability and usefulness to other entities).

The results of the final/terminal evaluation will primarily be used by:

- 1. the UNDP CO and national project teams in addressing any final steps in securing sustainability of the project and a smooth transition for handover of the project-implemented expertise and knowledge to the national counterparts;
- the national counterparts, to ensure that the facilities developed continue to contribute to the national goal, which is to overcome the consequences of toxic chemical used in the war in Vietnam upon completion of the project in December 2014;
- 3. the UNDP Montreal Protocol Unit, national & regional UNDP offices in dissemination of lessons learned from the project to other projects in the organizations related to POP/chemicals management and treatment under the Stockholm Convention.

The scope of evaluation includes 3 principal components:

- An analysis of the attainment of national environment objectives, outcomes, impacts, project objectives and delivery and completion of project outputs (based on indicators); and to what extent the overall global project has achieved;
- An evaluation of project achievements according to GEF Project Review Criteria:
 - Implementation approach;
 - Country ownership/driven;
 - Stakeholder participation/Public involvement;
 - Sustainability;
 - Replication approach;
 - Financial planning;
 - Cost-effectiveness;

• Monitoring and evaluation.

10.4.3. EVALUATION APPROACH AND METHOD

An overall approach and method¹ for conducting project terminal evaluations of UNDP supported -GEF financed projects have developed over time. The evaluator is required to frame the evaluation effort using the criteria of relevance, effectiveness, efficiency, sustainability, and impact, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (Annex C). The evaluator is required to amend, complete and submit this matrix as part of an draft evaluation report, and shall include it as an annex to the final report.

The evaluator shall consult with UNDP CO in the development of the methodology and evaluation approach. The methodology that will be used by the evaluation team should be presented in the report in detail. It shall include detailed information on:

- Documentation review;
- Interview with related stakeholders;
- Field visits (if any);
- Questionnaires; and
- Participatory techniques and other approaches for the gathering and analysis of data.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is required to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal points, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders.

The assessment of progress and sustainability issues also need to be looked at least 2 hotspots (among 3 hotspot) of the project and field visit may be required and travel arrangement/cost for field visits will be made/covered separately by the project.

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual Project Report (APR) /Project Implementation Report (PIR), project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

¹ For additional information on methods, see the <u>Handbook on Planning, Monitoring and Evaluating for Development Results</u>, Chapter 7, pg. 163

10.4.4. EVALUATION CRITERIA & RATINGS

An assessment of project performance will be carried out, based against expectations set out in the revised Project Logical Framework/Results Framework of inception report (see <u>Annex</u>A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance**, **effectiveness**, **efficiency**, **sustainability and impact**. Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in <u>Annex</u>D.

Evaluation Ratings:				
1. Monitoring and Evaluation	rating	2. IA& EA Execution	rating	
M&E design at entry		Quality of UNDP Implementation		
M&E Plan Implementation		Quality of Execution - Executing Agency		
Overall quality of M&E		Overall quality of Implementation / Execution		
3. Assessment of Outcomes	rating	4. Sustainability	rating	
Relevance		Financial resources:		
Effectiveness		Socio-political:		
Efficiency		Institutional framework and governance:		
Overall Project Outcome Rating		Environmental :		
		Overall likelihood of sustainability:		

10.4.5. PROJECT FINANCE / COFINANCE

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing	UNDP own	OP own financing Government		t	Partner Agency		Total	
(type/source	(mill. US\$)		(mill. US\$)		(mill. US\$)		(mill. US\$)	
)	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants								
Loans/Concess								
-ions								
In-kind support								
Other								
Totals								

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programmers. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

10.4.7. *IMPACT*

The evaluators will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) verifiable improvements in ecological status, b) verifiable reductions in stress on ecological systems, and/or c) demonstrated progress towards these impact achievements.2

10.4.8. CONCLUSIONS, RECOMMENDATIONS & LESSONS

The evaluation report must include a chapter providing a set of conclusions, recommendations and lessons.

10.4.9. IMPLEMENTATION ARRANGEMENTS

The principal responsibility for managing this evaluation resides with the UNDP CO in Vietnam. The UNDP CO will contract the evaluators (a team of 1 international and 1 national). The Project Team (PMU) will be responsible for liaising with the Evaluators team to set up stakeholder interviews, field visit arrangement (if any), coordinate with the Government etc.

If any discrepancies have emerged between impressions and findings of the evaluation team and the above-mentioned parties, these should be explained in an annex attached to the final report.

10.4.10. EVALUATION TIMEFRAME

The number of working days estimated for the evaluation task is 25-30 days for each consultant according to the following tentative plan:

Activity	Timing
Preparation (including desk	5-10 days
review, interview question and	
questionnaire if any)	
Evaluation Mission +	7-10 days in Vietnam (depend on requirement of field visit)
Debriefings	
Draft Evaluation Report	5 days
Final Report	5 days
The exact number of working days should be proposed in the proposed tentative work plan attached to the Technical proposal.

The assignment is expected to be taken during **Sept-Oct 2014**. Submission of first draft report is expected in **Oct 15, 2014** tentatively.

10.4.11. EVALUATION DELIVERABLES

The evaluation team is required to deliver the following:

Deliverable	Content	Indicative Timing	Responsibilities
Work plan (or Inception Report)	Evaluators provide clarifications on timing and method	-The tentative work plan submitted as a part of application -The final work plan submitted in 2 weeks after contract signing	Evaluators submit application to UNDP CO
Presentation at debriefing	Initial Findings	End of evaluation mission in Hanoi	To UNDP CO and PMU
Draft Final Report	Full report, (per annexed template) with annexes	Within 3 weeks of the evaluation mission	Sent to UNDP, PMU and reviewed by RTA
Final Report*	Revised report	Within 1 -2 weeks of receiving UNDP comments on draft	Sent to UNDP CO, PMU and RTA for uploading.

*When submitting the final evaluation report, the evaluators are required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report.

10.4.12. TEAM COMPOSITION

A team of one independent international and one national experts will conduct the final/terminal evaluation. Experts should not have participated in the project preparation and/or implementation and should not have conflict or interest with project related activities.

The International Consultant plays the role of a **Team Leader**, which has overall responsibility for the work and operation of the evaluation team, including the coordination of inputs from national team member. The Team Leader is responsible and overall accountable for the production of the agreed outputs. The specific duty of the international expert is described as below:

- Desk review of existing project plans, survey/ research/ evaluation reports and databases.
- Conduct fieldwork together with the national counterpart and interview stakeholders, and communities (if necessary) to generate authentic information and opinions.

² A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROTI) method developed by the GEF Evaluation Office: <u>ROTI Handbook 2009</u>

- Write and compile the information and reports as needed.
- Make a presentation of key findings highlighting achievements, constraints, and make practical recommendations.
- Draft and finalize the Evaluation Report

The Local Consultant plays the role of **Team Member**, which assists and collaborates with the Team Leader in all the tasks mentioned above including fieldwork, mission schedule/logistic arrangement in

cooperation with PMU, desk-based translation, etc and assist with interpretation in meetings/discussions during the field mission. The national consultant will be mobilized several days before the Team Leader in an effort to collect data related to the project beforehand. Specific tasks as following:

- Desk review of project materials and databases in national language (Vietnamese) and process data from this documentation necessary for the purposes of the evaluation;
- Fieldwork participation together with international consultant and national counterpart. Carry out stakeholders interview and do interpretation work (if necessary)
- Write brief notes, or certain parts of the evaluation report as agreed with the Team Leader.
- Provide inputs either by written or verbally through discussions to international consultants for consolidating a presentation of key findings highlighting achievements, constraints at debriefing
- Contribute to draft and final Evaluation Report

10.4.13. The Team Leader and Team Member must present the following qualifications:

For Team Leader:

International Consultant (Team Leader) should have the following competencies and qualifications:

- Post graduate degree in development study, environmental engineering, environmental science, chemistry, biology, biological science, or environment related fields;
- At least 10 years of working experience or technical expertise in the field of hazardous waste management, POPs waste/dioxin or environmental and chemical management;
- Experience with POP/dioxin contamination nature in Vietnam is desirable, knowledge on actual dioxin hotspots is strong asset;
- Knowledge of POP waste remediation technology, POPs/dioxin technical issues and/or knowledge of Stockholm Convention and other related international conventions will be considered as an asset;
- Experience in project management and /or evaluation of ODA projects;
- Proven knowledge of UNDP/GEF policies and strategies and is responsible for summarizing expert inputs and finalizing the report. Previous experience with results-based monitoring and evaluation methodologies, especially proven previous experience GEF/UNDP monitoring and evaluation policy and approaches would be preferable;
- Strong conceptual thinking and analytical skill;
- Experience as team leader of project evaluations;
- Proven proficiency in the English language, especially competent in technical English writing (through writing sample and tentative work plan provided for assessment).

For Team Member

National Consultant should have following competencies and qualifications:

• Post graduate degree in development study, environmental engineering, environmental science, chemistry, biology, biological science, or environment related fields;

- At least 5 years experience in project implementation, management and evaluation or consultancy works or donor-funded development projects in Vietnam;
- Proven experience in the areas of environmental and chemical management. Certain knowledge or familiarity with POPs/dioxin issue or hazardous waste management will be an asset;
- Knowledge of M&E and evaluation methodology or previous experience with results-based monitoring and evaluation methodologies. Proven past experience in conducting evaluations GEF/UNDP projects, especially environment-related projects, will be an advantage;
- Proficient English writing and communication skills, with an ability to act as translator for international counterpart and to translate written documents from/ to Vietnamese are essential (*writing sample must be provided for assessment*);
- Proven team work experience through past assignments.



Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the <u>UNEG 'Ethical Guidelines for Evaluations'</u>

10.4.15. PAYMENT MODALITIES AND SPECIFICATIONS

Payment, inclusive of international travel costs (transportation and DSA), if any, will be affected accordingly to the milestones indicated below:

%	Milestone
20%	Final work plan agreed by UNDP CO in 2 weeks after contract signing
50%	Following submission of the 1 st draft terminal evaluation report with agreement of UNDP CO
30%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report

Note: Domestic travel during field mission (if any) will be arranged and provided separately by PMU

Satisfactory Certification for Payment by the Team Leader will be required before payment is made to team member.

Two separate Individual contracts will be issued to each consultant