2014 INTERNATIONAL OIL SPILL CONFERENCE

A Decision-making Process for the Election of a Tier II Oil Spill Response Mechanism

December 15, 2013

Marc M. R. Rudder

Senior Petroleum Engineer

Health, Safety and Environment Division, Ministry of Energy and Energy Affairs,

Tower C, International Waterfront Centre, 1 Wrightson Road, Port of Spain, Trinidad and Tobago

mrudder@energy.gov.tt

ABSTRACT 300209:

Trinidad and Tobago has been involved in the oil industry for quite some time now. This twin-island Caribbean state recently celebrated 100 years of commercial oil production. The first Trinidad oil well was drilled in 1857, two years before the Drake well in Pennsylvania. With respect to oil spills, the largest vessel-related oil spill took place just off Tobago in 1979 as a result of a collision between two Very Large Crude Carriers. Fortunately, the first National Oil Spill Contingency Plan (NOSCP) was developed just two years prior and its activation assisted with Tier III management of this incident. This history surely warrants a robust in-country system for preparedness and response to oil spill events. The 1977 NOSCP instituted a system for the management of Tier II incidents based on assignment of Marine Areas of responsibility to oil companies and the Coast Guard. However, with the proliferation of operators since 1977, this system proved to be unsustainable. Alternative systems were evaluated in 2009 based on an environmental assessment tool known as Multi Attribute Utility Theory that enabled a level of objectivity. The process culminated with a recommendation of two possible systems that would be favorable to the Trinidad and Tobago context. One system was a Tier II system operated and controlled primarily by the Government and the other was a system operated by the oil and gas companies operating in Trinidad and Tobago. In the final analysis, and with counsel, the operator-led system was chosen as the most suitable system for Trinidad and Tobago. This upgraded Tier II system was incorporated in the revised Trinidad and Tobago NOSCP which was approved by Cabinet on January 31, 2013. This paper will present the process of decision-making employed in this matter by a committee composed of Government and energy sector companies in order to enable other countries in the Caribbean and beyond to employ a useful environmental assessment tool to assist in their own decision-making processes.

INTRODUCTION:

Trinidad and Tobago (T&T) is a twin-island State in the Caribbean just off the South American continent. Trinidad, the larger of the two islands, has a roughly rectangular shape (boot-shaped may be more accurate) measuring 60 km by 80 km with a total land area of 4,828 square kilometers whereas Tobago is fish-shaped measuring 42 km by 10 km with total land area of 300 square kilometers (TTConnect, 2013). As such the combined size of Trinidad and Tobago is a little smaller than the State of Delaware. The Exclusive Economic Zone (EEZ) of Trinidad and Tobago is about 75,000 square kilometers (seaaroundus.org, 2013) which is about 15 times

the land area. The population of T&T is 1.26 million people, with about 54,000 persons resident in Tobago according to the Central Statistical Office 2010 Census Data (CSO 2011).

The Energy Sector contribution of the Gross Domestic Product (GDP) of T&T currently stands at about 45% and is about 80% of exports. As such the Energy Sector is vital to the economic paradigm of the country and to its continued growth and development. The first oil well was drilled in Trinidad back in 1857, two years before the Drake well of Pennsylvania and T&T recently celebrated 100 years of oil production in 2008. It is within the context that it was important to develop a National Oil Spill Contingency Plan (NOSCP) for T&T as Trinidad was producing approximately 165,000 barrels of oil per day (39,000 barrels per day coming from offshore fields), there were two refineries with a total throughput of 360,000 barrels of oil per day and some 200,000 barrels of crude oil and petroleum product transported each day to, from and within the island (NOSCP 1977).

When the first National Oil Spill Plan (NOSCP) was developed in 1977 there were but a few local and International Oil Companies (IOCs) in operation on land and marine areas. The system that was utilized for the management of Tier II oil spills (spills that need to be managed at the National level) at that time was called the Area Controller System. Assignments of marine acreages were given to companies and organizations in order to provide surveillance and a response to such a spill.

The marine area of T&T was divided into five areas. Area 1 existed on the West Coast of Trinidad covering from the Capital city, Port of Spain (Point A) to Barracones Point (Point B) and was assigned to the National Petroleum Marketing Company Limited (NPMC) who operates an oil terminal on the Coast in the Port of Spain area. Area 2 covered the area from Barracones Point to the La Romaine area (just north of the Oropuche River outfall) (Point C) and was assigned to Texaco Trinidad Inc. (now Petroleum Company of Trinidad and Tobago (Petrotrin)) who operates a refinery in that area. Area 3 covered the area from La Romaine area to Quinam Bay (Point D) on the South Coast and was assigned to Trinmar (now called Petrotrin Trinmar) who operated a refinery in that area. Area 4 covered from Quinam Bay on the South Coast to Galera Point (Point E) on the North West Coast and was assigned to Amoco (now bp Trinidad and Tobago (bpTT)) who operates an oil terminal in that area. Area 5 covered from Port of Spain on the West Coast to Galera Point on the North West Coast including coverage of all of Tobago and was assigned to the Trinidad and Tobago Coast Guard. It must be noted that the coverage for Areas 1, 2 and 3 extended to the T&T/Venezuela border while Areas 4 and 5 extended as far as the EEZ (NOSCP 1977).

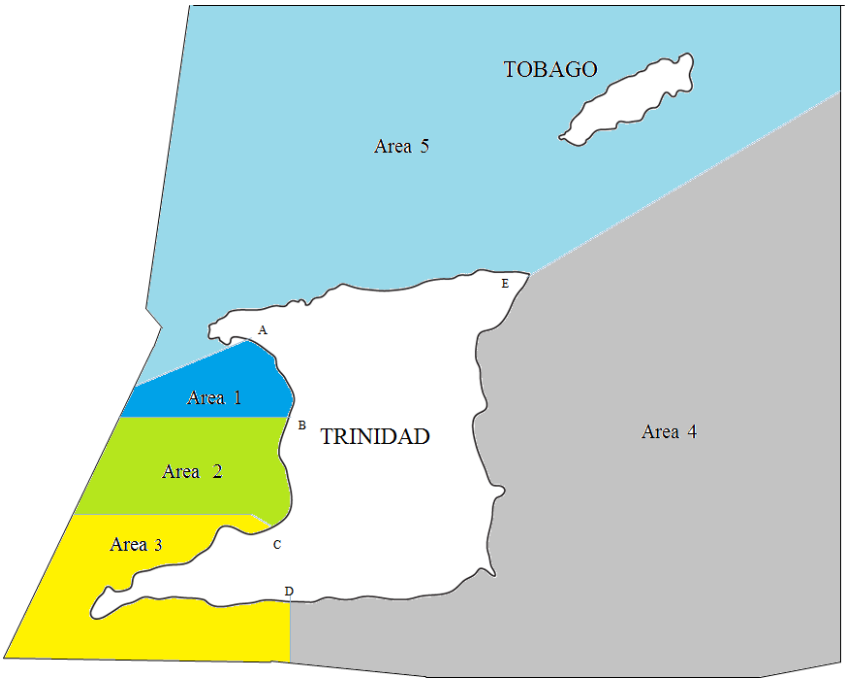

Fig. 1: Area Controller System of Trinidad and Tobago 1977 (Not to scale)

It was under the jurisdiction the 1977 Plan that the major oil spill incident which occurred on 1979 where two very large crude carriers, the Atlantic Empress and the Aegean Captain collided just off the East Coast of Tobago leading the largest vessel-related oil spill in the world to date. This situation was considered a Tier 3 event (meaning international assistance for oil spill management is required) and the Clean Caribbean Cooperative (now Oil Spill Response Limited (OSRL)) operating out of Fort Lauderdale, Florida along with T&T national resources addressed this incident.

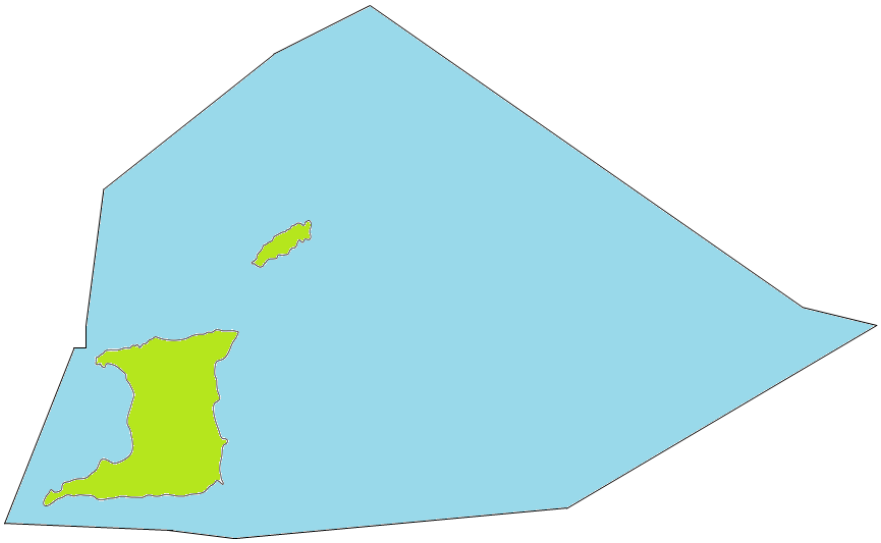

Fig.2: Exclusive Economic Zone of Trinidad and Tobago (Not to scale)

Since the development of 1977 NOSCP, the amount of local and international oil companies have increased significantly. The main contributors to this phenomenon have been increases to the EEZ on the North and East Coasts of T&T and the opening of new acreage on the continental shelf, the deep waters and the ultra-deep waters, the offering of acreage to companies using the Competitive Bidding Process and the use of Production Sharing Contracts with the requisite incentives for exploration and development. As such it was in Areas 4 and 5 that had a proliferation in the amount of IOC operatorship compounding the burden of their Area Controller stewardship. This phenomenon led to the increasing unworkable and unsustainable nature of the Area Controller System and the reason why there was a need to find an alternative solution to this system. This purpose of this paper is to describe and explain the process that lead to the development of new system for managing Tier II oil spills in Trinidad and Tobago that was accepted by majority agreement. The process that was used was Multi Attribute Utility Theory (MAUT) which is a very useful and largely objective approach for multidimensional decision-making.

METHOD:

The approach that was adopted was to treat this issue as a policy conflict which required resolution by Government then use MAUT to assess the various possible solutions. To give the discussions focus we pursued the policy analysis approach in looking at the conflict/problem we are trying to solve. Here are the main questions that we needed to answer as part of this policy analysis:

1. Describe the nature of this conflict and the current situation in T&T. What is the historical and geographical background of this conflict?
2. What is the potential conflict intensity related to this conflict?
3. Which stakeholders are involved in this conflict, what are their interests and their attitude toward the different alternatives?
4. What criteria should be used to analyze the alternatives?
5. Develop a scorecard as a first step in comparing the alternatives

The nature of the conflict as described in the Introduction was an issue of increasing responsibilities for Area Controllers by the increase in the acreage that required surveillance and response and liability issues relating to operators being required to respond to spills for which they may not be responsible in more challenging environments. It was deemed that the conflict could escalate to the point where spills may not be attended to in a timely manner rendering increased liability to the State. It was thus decided to bring all the Area Controllers and relevant regulatory agencies together to form a sub-committee of the Cabinet-appointed National Oil Spill Contingency Plan (NOSCP) Committee to determine a solution to this issue.

The agencies involved in the process of find a solution were the major local and international oil and gas companies, Retail Marketing Companies and Government Agencies with the Ministry of Energy and Energy Affairs (MEEA) as the lead. The final decision-making on the organizations to be part of the sub-committee were arrived at through the first couple of meetings held using the matrix as shown in Fig. 3 below was deliberated on. The objective of

this matrix is to determine the organizations that are both very important to the process and outcome as well as have high influence on the success of the policy decision. These were the agencies/ organizations that were invited to participate in the decision-making process.

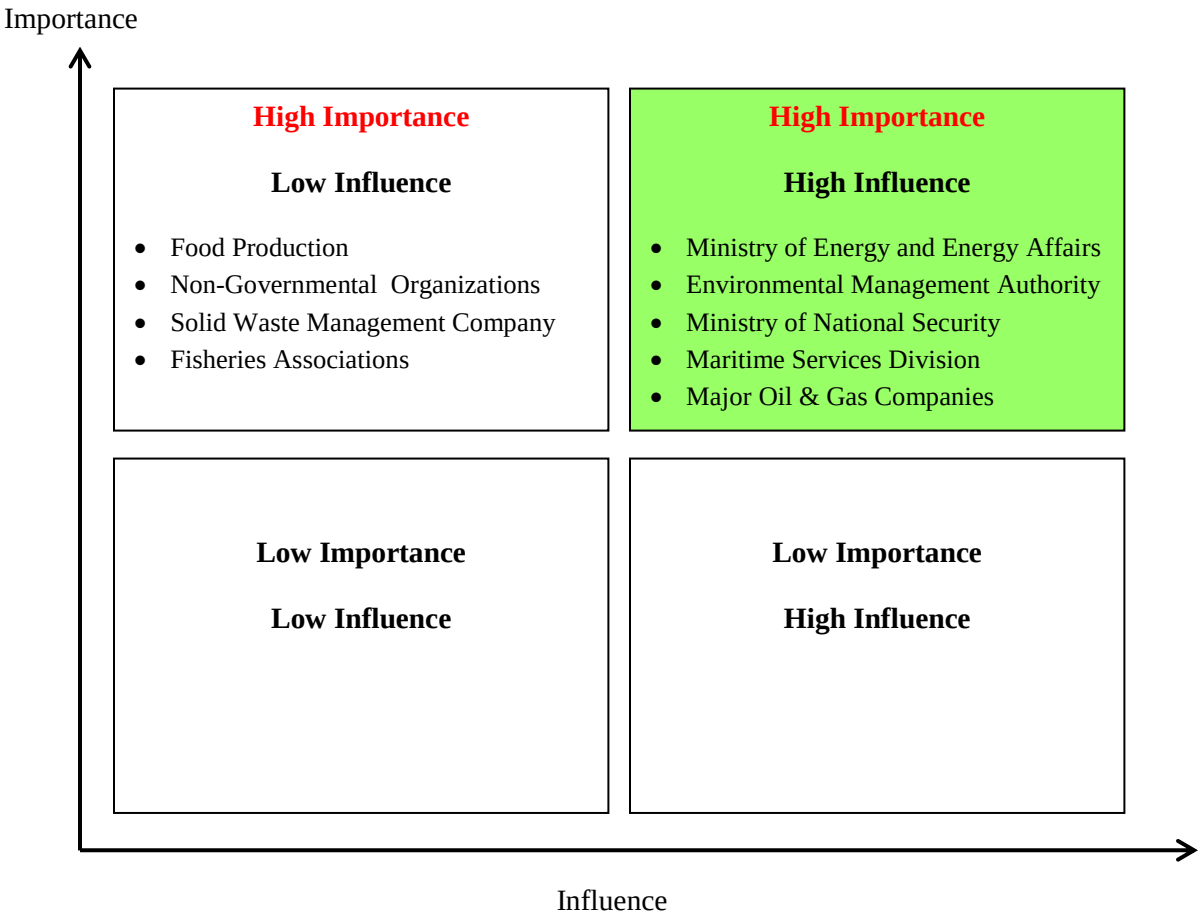

Fig.3: Importance-Influence Matrix for Determination of Key Stakeholders in the Policy Development Process

The criteria and their definitions used to analyze the alternatives using MAUT were as follows:

1. *Rapid Response* - The relative speed of response between alternatives based on the time it would reasonably take to mobilize adequate personnel and equipment to the spill location
2. *Equipment best-use strategies* - Which system would perform best in minimizing the amount by type and distribution of oil spill equipment stored in Trinidad and Tobago. Systems that best consolidate equipment would receive higher scores than those that require each entity to have various amounts and types of equipment.
3. *Equitable* - A comparison of the fairness of a system in terms of how responsibility for response to an oil spill is distributed based upon potential to cause an oil spill incident.
4. *Sustainable Funding* - A comparison of the longevity of a system based on where the funding would be sourced. If the funding is sourced more from Government, then the

longevity of the system increases, and vice versa. This is made under the assumption that the Oil Companies would not be here forever, while the Government would always be present.

5. *Cost for Companies* - Which system would provide a relatively greater capital outlay for the Oil Companies? Systems with greater costs to the Operator received lower scores.
6. *Cost for Government* - Which system would provide a relatively greater capital outlay for the Government? Systems with greater costs to Government received lower scores.
7. *Encourages Response* - Which system provides a relatively greater motivation to respond to oil spill incidents in Trinidad and Tobago? Systems that provide a greater motivation to respond receive higher scores than those that do not.
8. *Trans-boundary Response* - Which system is best set up to easily handle spill incidents that impact more than one licensed area and also cross-border issues affecting more than one country? Systems that can more easily handle cross-border incidents receive higher scores.
9. *Assimilation into Existing Legal Framework* - Systems that require new legislation to be passed to be enforced receive lower scores than systems that can be incorporated into the existing legal framework of Trinidad and Tobago.
10. *Reputational Issues for Operators* - System would ensure that operators have more control of the manner in which an oil spill is handled in order that their reputation as good corporate citizens are seemingly protected received higher scores
11. *Speed of Implementation* – A measure of how quickly the management system could be set-up and be functional and operational. For this criteria we developed a scale for analysis:

Table 1: Table Indicating Scoring System for Speed of Implementation of the Management System under Review

Speed of Implementation in years & corresponding Score assignment	
Years	**Score**
0 – 1	3
1 – 2	2
2 – 3	1
3 – 4	0
4 – 5	-1
5 – 6	-2
6 – 7	-3

The Sub-committee developed a list of alternatives to the Area Controller system. This list is provided as follows with an explanation of what each alternative entailed:

1. *Alternative 0: Maintain Current Arrangement* - This is the zero alternative. The current arrangement is to have an Area Controller System with 5 areas in which the Controllers are NPMC, Petrotrin, Petrotrin Trinmar, bpTT and the T&T Coast Guard (TTCG).

2. *Alternative 1: Break up Area 4 and add an Area 6*
    a. Area 4 is the marine are off the East Coast of Trinidad is operated by bpTT. There are other oil producing operators on the East Coast of Trinidad.
    b. The responsibility for Area 4 could be split up and apportioned to BHP Billiton, EOG Resources, Repsol, BG T&T and bpTT.
    c. BHP Billiton can become the Area Controller for Tobago – a new area called Area 6

3. *Alternative 2: The TTCG is the only responder*
    a. For any Tier II spill that occurs, the Coast Guard would be the only other responder to that spill other than the responsible party that created that spill.
    b. It is assumed that the responsible party would not receive assistance from other operators
    c. It is assumed that this is based on how the TTCG is currently configured to handle oil spills

4. *Alternative 3: Tier II Oil Spill Response Organization (OSRO)*
    a. A private contractor similar to Clean Caribbean and Americas (CCA) (now OSRL) would set up bases in Trinidad and Tobago
    b. The cost of base would be borne by the oil companies
    c. Bases would be set up around Trinidad and Tobago based on a prescribed response time requirement set by the Government.

5. *Alternative 4: Each Production Sharing Contract (PSC) Operator/Licensee is an Area Controller, TTCG Responsible for the rest*
    a. This is similar to the Area Controller System, except the boundaries are defined by the Acreage awarded based on a Production Sharing Contract or a License with Government.
    b. Acreage that has not been awarded to any operator or has been relinquished by an operator would be handled by the Coast Guard.

6. *Alternative 5: Tier II base with TTCG as Responder*
    a. Tier II base contractor hired by the TTCG
    b. The equipment will be owned by the TTCG
    c. The equipment will be maintained by the Contractor.
    d. TTCG would respond to spills and Contractor would assist in the response with personnel.

7. *Alternative 6: Alternative 1 and 3 combined*
    a. Area Controllers (6 or more) with a Tier II base system
    b. Area Controllers would function as per outlined in the requirements however they would not be required to have extra equipment as per the current system. The equipment will be sourced from the base(s).

8. *Alternative 7: Area Controllers are Tier II Base*
    a. Set up Tier II bases at the existing Area Controller locations or the expanded list of Area Controllers.
    b. The Area Controllers would be responsible for stockpiling extra equipment to handle their areas

9. *Alternative 8: Dedicated unit of TTCG (under existing legislation)*
    a. A separate unit of Coast Guard personnel set up in another Government Agency e.g. MEEA or Environmental Management Authority (EMA) operating under the laws of the respective agency (similar to Coast Guard Port Security System (ISPS))
    b. Unit would have dedicated personnel, equipment, budget, etc. and would have wider ranging powers than under the Ministry of National Security.
    c. Assumption that the unit will operate similar to the US Coast Guard system

The Stage 1 process of filling out the MAUT matrix was to employ a sliding scale of -3 to +3 and to provide scores for each Alternative one Criterion at a time. That is, the first Criterion would be selected for scoring and the matrix would be filled in from left to right across all Alternatives as shown in Table 2. Then, a second Criterion was selected and the process was followed until all the Alternatives were scored across each of the 8 Criteria. The Stage 2 process of filling out the matrix involved a repeat of the process but with the application of weighting factors to each Criterion as shown in Table 3 based on a comparison of the greater importance of the Criteria. This methodology lent itself for greater objectivity for the analysis and for the outcomes developed by the committee.

The Stage 3 analysis involved the combination of some of the favorable alternatives and the results were compared with one another in order to further analyze the merits of Alternatives 3 and 4. It was deemed that Alternative 8 was an arrangement that could be arranged regardless of the main choice so it was decided that this Alternative would be the common denominator. Thus, first part of Stage 3 analysis was to combine Alternatives 3 and 8 (see Table 4) and the combinations were aggregated so that the maximum and minimum values of the combinations fall within the -3 to +3 range and that the scores would not be added if they were both positive, but the higher of the two scores would be taken as the aggregate score. This process was repeated for the second part of the Stage 3 analysis for Alternatives 3, 4 and 8 (see Table 5).

RESULTS:

Table 2: Stage 1 Analysis - Ranking of Alternatives without Weighting Factors to the Criteria

Criteria	Alternatives								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	-1	0	-2	2	1	-2	2	-1	2
2	-1	0	-2	2	1	1	2	-1	2
3	-3	-2	-1	2	3	2	2	1	-1
4	-2	-2	1	-2	-1	-1	-2	-3	2
5	2	1	3	-2	1	-1	-3	1	3
6	1	1	-3	1	-1	-1	1	1	-3
7	-2	-2	-1	3	0	2	1	-1	2
8	-1	-1	3	-1	1	3	-1	-1	3
9	1	1	1	-1	1	-1	-1	-1	2
10	-2	-1	-3	2	3	-2	1	-2	-1
11	3	3	0	1	0	1	1	2	0
Total	**-5**	**-2**	**-4**	**7**	**9**	**1**	**3**	**-5**	**11**

Table 3: Stage 2 Analysis - Ranking of Alternatives with Weighting Factors to the Criteria

Criteria	Alternatives								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1 (x3)	-3	0	-6	6	3	-6	6	-3	6
2 (x3)	-3	0	-6	6	3	3	6	-3	6
3 (x2)	-6	-4	-2	4	6	4	4	2	-2
4 (x2)	-4	-4	2	-4	-2	-2	-4	-6	4
5 (x2)	4	2	6	-4	2	-2	-6	2	6
6 (x2)	2	2	-6	2	-2	-2	2	2	-6
7 (x1)	-2	-2	-1	3	0	2	1	-1	2
8 (x1)	-1	-1	3	-1	1	3	-1	-1	3
9 (x1)	1	1	1	-1	1	-1	-1	-1	2
10 (x1)	-2	-1	-3	2	3	-2	1	-2	-1
11 (x1)	6	6	0	2	0	2	2	4	0
Total	**-8**	**-1**	**-12**	**15**	**15**	**-1**	**10**	**-7**	**20**

Table 4: Stage 3 Analysis - Ranking of Combination of Alternatives 3 and 8

Criteria	Alternatives		
	3	**8**	**Combination of 3 and 8**
1	2	2	2
2	2	2	2
3	2	-1	1

4	-2	2	0
5	-2	3	1
6	1	-3	-2
7	3	2	3
8	-1	3	2
9	-1	2	1
10	2	-1	2
11	1	0	1
Total	**7**	**11**	**13**

Table 5: Stage 3 Analysis - Ranking of Combination of Alternatives 4 and 8

Criteria	**Alternatives**		
	4	**8**	**Combination of 4 & 8**
1	1	2	2
2	1	2	2
3	3	-1	2
4	-1	2	1
5	1	3	3
6	-1	-3	-3
7	0	2	2
8	1	3	3
9	1	2	2
10	3	-1	2
11	0	0	0
Total	**9**	**11**	**16**

DISCUSSION:

The Stage 1 assessment of the nine (9) alternatives employing the eleven criteria (11) yielded some interesting outcomes (see Table 2). The Zero Alternative scored the joint lowest. This was seen as an indictment on the status quo indicating that there was definitely the need to change the Area Controller System. Five of the Alternatives had positive scores while the other four had negative scores. The Alternatives with the negative scores were not considered any further and were eventually discarded.

Of the five alternatives with the positive scores, three of them stood out. They were Alterative 3, Alterative 4 and Alterative 8. In an attempt to further differentiate between them a Stage 2 assessment (see Table 3) was conducted which revealed that these alternatives were the most noteworthy. As it turned out Alternative 4 scored slightly higher than Alternative 3 in the Stage 1 assessment but in the Stage 2 assessment they had identical scores. The Stage 3 assessment was conducted to differentiate the merits of Alternatives 3 and 4 by combining each of them with Alternative 8 as it was deemed necessary to so organize the Coast Guard to manage

HSE incidents. Based on this assessment Alternative 4 scored slightly higher than Alternative 3 (see Tables 4 and 5).

In the final analysis, a decision needed to be made between Alternatives 3 and 4. It was decided that the recommendation would need to be based on the system would be easier to manage and coordinate by the Government, primarily, in terms of a response, and the system that is believed would be a lesser cost to operate. Based on Stage 3 analysis, Criteria 7, which measured efficiency of response, scored lower for the combination of Alternatives 4 and 8 than for Alternative 3 and 8. Also, based on the Stage 3 analysis the only criteria that scored negatively was Criteria 6 – Cost to the Government – and that score was lower for the combination of Alternatives 4 and 8 than for Alternative 3 and 8. As a result it was determined that Alternative 3 and 8 combined should be recommended as the best methodology for managing Tier II oil spill response in Trinidad and Tobago. Later, it was discovered that the International Petroleum Industry Environmental Conservation Association (IPIECA) had obliquely endorsed the chosen mechanism (IPIECA Report Series Volume 14, 2007) which further confirmed that that option was a good choice for the Trinidad and Tobago circumstance.

CONCLUSIONS:

The use of MAUT was seen as an excellent tool for assisting in the determination of an environmental solution for national Tier II oil spill management. All the parties that participated in the process agreed that this process led to almost completely impartial determination of the feasible options for finding a solution. It should be noted that not all the parties involved was totally in agreement with the outcome, however there was agreement that the solution chosen was deemed to be in keeping with international best practice for managing oil spills on a country and regional level. As a result, the majority agreed that they would work together to make the recommendation a reality in Trinidad and Tobago. In addition, this system made part of the NOSCP 2013 and thus a requirement in T&T. A similar use of MAUT for arriving at a consensus position by both government and industry in establishing a Tier II system is an extremely useful approach and thus recommended for consideration particularly by other Small Island Developing States (SIDs) and even larger countries that have complex situations that require similar objective analysis.

REFERENCES

1. TTConnect, Government of Republic of Trinidad and Tobago Online, www.gov.tt (last accessed 13/12/13)
2. Sea Around Us Project, EEZ of Trinidad and Tobago, www.seaaroundus.org (last accessed 13/12/13)
3. Central Statistical Office, 2011, Central Statistical Office Census Data 2010
4. Ministry of Energy and Energy Affairs, 1977, National Oil Spill Clean-up Plan for Trinidad and Tobago, p. 2
5. Ministry of Energy and Energy Affairs, 1977, National Oil Spill Clean-up Plan for Trinidad and Tobago, p. 8
6. International Petroleum Industry Environmental Conservation Association (IPIECA), 2007, IPIECA Report Series Volume 14 - Guide to Tiered Preparedness and Response, p 22.