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## **RECOMMENDATIONS FOR MANAGEMENT OF FIELDWORK OPERATIONS AT NRC – IOT**

LM-2006-07

Tony Randell

July 2006

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## **1.0 INTRODUCTION**

IOT's Management Priorities for 2006/07 included a requirement to "Establish mechanisms to ensure experience in carrying out Full-scale trials is shared and the equipment is maintained and managed". This requirement was further identified in the Facilities objectives for 2006/07 as a facilities objective to " Develop and implement a system to efficiently respond to requests for full-scale trials". To respond to this requirement I was tasked by David Murdey, director of facilities, to investigate IOT's needs and to prepare this report to management outlining my findings and recommendations.

## **2.0 SCOPE OF REPORT**

While the original requirements refer to "Full-Scale trails" the scope of the requirement was expanded beyond this to cover all aspects of fieldwork performed by IOT. For IOT purposes, Fieldwork (or field trials) is defined as work performed by IOT employees taking place outside NRC premises in an outdoor environment. In generally this will be a marine environment, but is not limited to such.

The intent of this report is primarily to recommend how IOT should organize its staff and operations in order to better respond to project requirements for Fieldwork. This report will also provide some guidance and recommendations regarding policy and operational scope, particularly as it concerns safety. It is not the intention of this report to provide detailed recommendations regarding very specific procedures, equipment requirements or other technical and operational aspects of fieldwork operations. Preparing this report required examining IOT's needs and existing capabilities and determining effective ways of allowing IOT to perform fieldwork to meet project requirements in a safe, cost effective, and timely manner.

### **3.0 BACKGROUND INFORMATION**

IOT has over the past 20+ years been involved in a very diverse range of projects involving fieldwork. In general this has been in a marine environment but there have been cases that also involved onshore work. The scope has ranged from full-scale sea-trials of icebreakers and warships to Ice sampling and insitu testing in Severe Arctic conditions. The vessels have ranged in size from large warships to small open boats and life rafts and from Aquaculture installations to a Space shuttle launch site. Given such diversity it would very difficult to define a typical fieldwork scenario but the potential for having to work in severe environmental conditions is clearly a distinct possibility and safety has to be of the utmost concern.

Recently the demand for fieldwork has increased significantly IOT. There are at least ten active projects at IOT that involve some form of fieldwork. This is probably a result of the fact that the research focus at IOT has shifted to new areas that require more fieldwork than in the past. Marine safety systems research has had requirements over the past few years for fieldwork involving evaluation of liferaft and lifeboat performance and there are plans for more fieldwork, including work in ice, over the next year. This work typically involves using smaller vessels in more exposed conditions where safety concerns and potential risks are perhaps greatest. Recent research projects in Ocean Energy Systems have resulted in fieldwork requirements that also typically involve small craft in open environments and the same is true for Aquaculture projects involving that require fieldwork. There has also been recent activity involving full-scale ship trials, such as with the USCG Mackinaw Full Scale Ice Trials project. This type of project involves large vessels that has much better developed safety protocols and are well regulated and managed with regard to safe operations as compared to small craft. They do, however, present significant logistical challenges and have very little latitude for problems once underway and must be very well organized and coordinated.

Given the nature of IOT's current research focus and the demands that it is creating for fieldwork it is clear that we need to quickly and properly organize in order to manage these needs successfully, and more importantly, safely.

#### **4.0 PROCESS / METHODOLOGY / ACKNOWLEDGEMENTS**

Since I personally have only limited experience in marine fieldwork, most of that over 25 years ago. It was imperative that I seek as much information and assistance from those at IOT who have the experience and knowledge in this area. Most of my info was gathered by interviews, discussion and correspondence with IOT staff and through researching information available over the Internet. The IOT staff involved were

Ralf Bachmayer	Emile Baddour	Keith Blundon
Austin Bugden	Spence Butt	Dave Cumming
Craig Kirby	Chris Meadus	Dave Millan
David Murdey	Jon Power	Antonio Simoe Re
Chris Williams	Mary Williams	Fraser Winsor

Additionally I had discussions with Jim Boone of OSSC regarding marine safety training

I would like to thank all those involved for their input and suggestions. I would like to thank Craig Kirby in particular, who has previously been involved in many aspects of fieldwork preparation and provided very helpful feedback and assistance.



## 5.0 ISSUES/PROBLEMS/OPTIONS

While many relatively minor technical issues were discussed most of these were related to the special needs of a specific project and would not be in the scope of this report. The main common area of concern was the fact that IOT did not have a clearly identified person/role that was responsible for managing fieldwork. Project managers had to manage most all aspects of the fieldwork or seek out assistance from others that they were aware of that could be of assistance. There was uncertainty about how to go about planning and preparing for fieldwork and where they should be looking to for help. It was clear very early in discussions that that all supported the idea of a more formally organized capability within IOT for providing fieldwork support to projects.

To address this requirement there are basically four options

- a) Continue to operate as we do – Status Quo
- b) Develop a part-time functional Field Trials Team (FTT) that has a team leader and a number of IOT staff identified as FTT members to provide fieldwork support to IOT projects on an ongoing basis.
- c) Have a “full-time dedicated” field trials team (FTT) leader with part-time field trials team members
- d) Have a full-time FTT, consisting of dedicated full-time team leader and team members

Option a) would not be worth considering since it does not result in any changes to address IOT’s fieldwork needs. Option d) would require much more salary resources than IOT is able to provide and there has not been sufficient demand for fieldwork at IOT to justify this manpower investment or to keep a full-time FTT sufficiently busy. This being the case only option b) and c) are potentially viable at this time. Given the issues associated with creating a new full-time FTT leader and the risk of ensuring sufficient workload it is recommend to chose option b) initially and to review the workload that the

part-time role is requiring on an annual basis to see if the demands are sufficient to require a full-time position.

The major drawback to having part-time positions is the inevitable challenge of “multi-tasking” that will be required for the FTT leader as well as for all FTT members. A key challenge for the FTT leader will be managing responsibilities for providing fieldwork support personal, particularly with regard to capacity planning and work priorities for FTT members. This will have to be accomplished without direct supervisor control or authority over FTT members work plans outside of fieldwork activities. Strong team building and negotiating skill competencies will be required on the part of the FTT leader. It is clear that the FTT leader role will require the experience, influence and skills of a senior staff member at a minimum of a TO4 level.

## **6.0 FIELD TRAILS TEAM (FTT) OPERATIONAL / POLICY RECOMMENDATIONS**

Recommendations:

### **6.1 Form a cross functional Field Trials Team (FTT)**

- 6.1.1 A team consisting of TO's from across IOT's groups should be formed. This would be a functional team that will have the broad skill set required to perform fieldwork. FTT duties would be a “part-time” role in addition to their normal work duties at IOT.

**As a prerequisite to recruitment FTT members should:**

- 6.1.2 Have good technical ability and especially good electromechanical skills. Also having FTT members with good software / programming skills would be very beneficial since this was identified by several people as a weakness that has occurred during previous fieldwork projects mainly where code was required to

interface various system components used for data collections and instrumentation

6.1.3 Represent both experienced and inexperienced TO's to ensure that skills and knowledge are passed on and that succession is planned.

6.1.4 Be comfortable in small craft in a marine environment as well as offshore in large vessels. They should not be "excessively" prone to seasickness.

**After recruitment, as required, FTT members should:**

6.1.5 Be trained in operating/debugging the data various systems they will be operating such as DAQ – Navigation, Motions, Communications, etc.

6.1.6 Become familiar with IOT trials standard procedures (listed on web for propulsion, sea keeping, & maneuvering trials).

6.1.7 Be trained and obtain valid certification in

- Marine First aid
- Marine Emergency Duties (MED A2)
- First Aid Oxygen therapy
- Automated external defibrillator (AED) operation
- Ice rescue and cold water survival
- Small craft operator certification

6.1.8 Receive annual medicals and medical clearance to participate in sea trials

6.1.9 Take any medical vaccination or treatment required to perform work safely

6.1.10 Have appropriate security clearances

6.1.11 Have a valid passport. FTT members should reapply for a new passport six (6) months prior to its expiration.

6.1.12 Participation in fieldwork should not be limited to members of the FTT. However, if others wish to participate, then they must receive appropriate training and medical clearance prior to participation. The FTT leader should recommend the extent of training/medical clearance that persons who are not FTT members require in order to participate in a specific fieldwork and in a specific capacity.

## **6.2 Establish a Functional Field Trails Team (FTT) leader role**

6.2.1 This role will be an added job responsibility to an existing position. Direct, or indirect, supervision of the “role” should be the responsibility of the Director of Facilities. It should not be required that the staff in this role be a direct report to the Director of Facilities in their main job position.

6.2.2 The FTT leader should be a source of expert advice and assistance to Project Managers when they are planning fieldwork. The leader should have significant experience in performing fieldwork and working in a marine environment and be aware of “Best practices” that should be utilized.

6.2.3 The FTT leader should, as a minimum, be a senior Technical Officer. This would provide for a more functional leadership relationship and would help ensure that the required competences for the role are at the appropriate level of development

6.2.4 They should be familiar with safety requirements and applicable regulations of any regulatory body that has jurisdiction where fieldwork is

occurring. In particular any Federal Treasury Board & NRC Safety Guidelines for Field Operations

**6.2.5 The responsibilities FTT leader should include**

- a) Recruiting team members and ensuring that:
  - A proper range of skills are represented
  - Succession planning is considered
  - Novices get support/training from more experienced team members
- b) Ensuring that team members have proper training by:
  - Identifying training requirements
  - Ensuring training is completed in a timely manner
  - Training standards and certifications are kept current as required
- c) Ensuring that Project managers are aware of applicable policy, procedures and regulations as applicable to the fieldwork they are engaging in.
- d) Ensuring that all required safety plans are properly prepared, reviewed and approved by them
- e) Ensuring travel authorities are prepared and signed off for all FTT members before performing any fieldwork.
- f) Ensuring that all FTT equipment is properly maintained and managed

FTT equipment is equipment that has a use beyond a single fieldwork project and is generally NOT equipment that is specific to a particular project

FTT equipment should include, but is not limited to:

- Safety equipment – floater suits, PFD’S, survival suits
- Communication devices – FRS radios, Marine radios, satellite phones, cellular phones
- Navigation devices – handheld GPS
- Mobile Field trials unit (trailer)
- Toolbox
- Digital cameras / video
- Wave buoy
- First-aid kit (trauma kit)
- Medical Oxygen system
- Automated external defibrillators (AED)

FTT equipment should generally NOT include:

- Data Acquisition systems
- Motions measurement systems
- Project specific Instrumentation
- IOT Truck

g) The FTT leader shall be responsible for managing that FTT equipment, including

- Consolidation in a secure location
- Ensuring operational status by tagging, testing, repairs,
- Performing Preventative Maintenance
- Ensuring that it is properly packaged and securing for transport
- Managing maintenance records and other documentation
- Implementing and maintaining a sign in – sign out system
- Ensuring that users are properly trained in operation of equipment

- Registration with Canadian customs authorities so it can be taken out of the country without difficulties
- Maintaining Insurance coverage (if required, as required)

#### **6.2.6 Schedule and manage the FTT as a Facility by:**

- Maintaining a schedule as per other IOT facilities and posting the schedule for web access
- Reviewing schedule status at facilities and project meetings
- Operating the FTT as an independent facilities project with annual project plan and budget that are administered by the FTT team leader as project manager
- Ensuring that sufficient time is allocated in capacity planning for team members to participate in fieldwork as well as for associated training requirements

#### **6.2.7 Ensure proper facility development**

With assistance for FTT members the leader should identify needs for new FTT equipment and capabilities. The FTT leader should be aware of the available technology and ensure for the “planned obsolescence” of existing equipment. Opportunities to have individual research projects fund development as well as purchase FTT equipment should be sought out, ideally, using collaborator or other sources of external funds to do this

FTT leader should work with project managers as well as group leaders to identify needs, both present and future, and plan for appropriate development tasks within the facility groups.

#### **6.2.8 Develop - implement – monitor Fieldwork related policies and/or procedures**

Where appropriate, the FTT Leader should develop specific policies regarding Team member “qualification”, use of equipment, hiring vessels, planning and scheduling of fieldwork, safety practices

### **6.3 Fieldwork Safety Plans**

Projects that involve fieldwork should prepare a standardized safety plan document for the fieldwork. The FTT team leader in consultation with the Project Manager should prepare the plan. It should be the responsibility of the project manager to ensure that safety plan is completed and authorized. The plan should:

- Identify an onsite Field Safety Officer as the “person in charge” of fieldwork safety. In some jurisdictions this may not be an IOT staff.
- List all IOT participants and relevant collaborators and have a “chain of command” specified for cases where the Field Safety Officer is not available.
- Identify all significant risks associated with the fieldwork and identify the precautions and measures in place to reduce those risks to an acceptable level.
- Identify the procedure and responsibilities for Go – No Go decision regarding operations or testing.
- Indicate how communications will be ensured, both within the team as well as communication with outside safety agencies such as coast guard search and rescue, Medical assistance, Fire department, etc.

The FTT team leader, the Project manager, and the Field Safety Officer should review the safety plan and sign off on it. At least one meeting of the entire IOT fieldwork team should take place to review the safety plan. Other appropriate persons, such as collaborators or persons with applicable expertise should also be invited to attend this



meeting. It will be important to ensure that the responsibilities assigned in the plan are commensurate with the authority of the people involved.

Whenever a safety related incident occurs, including “near misses” an incident report should be prepared and processed as per standard NRC policy.

In no case should fieldwork be performed alone. At least two persons with proper training should be present during all fieldwork operations

An example of a standardized Safety plan form is contained in Appendix 2a of reference 3

#### **6.4 Fieldwork Diving Operations**

All Diving operations for Fieldwork should be done in accordance with CSAZ275 standards for occupational diving operations at a minimum. IOT divers should not be involved in operations that exceed the limits for “restricted SCUBA diver ” as defined by the CSAZ275. Where fieldwork requirements exceed this level the diving operations should be contracted to a qualified commercial diving operation. Both the FTT leader and the IOT Dive team leader should approve any use of IOT divers for fieldwork.

#### **6.5 Motor vessels – Boats**

Based on the current fieldwork requirements IOT should not acquire and operate it own vessel. If a project requires a boat or vessel it should be hired with a skilled and experienced operator. The FTT leader should, over time, identify potential sources for such services, recognizing that PWGSC purchasing regulations will apply to any procurement of services. If operation of a boat by IOT staff is required it should only be operated by staff with proper training and should only be used for work related purposes

## **6.6 Motor Vehicles - Transportation**

Where appropriate, the IOT truck should be used for fieldwork. If the IOT truck is not available or not suitable for the fieldwork requirements then the appropriate vehicle(s) should be rented or hired and proper insurance coverage obtained.

### **IOT Truck**

The IOT truck was originally purchased for the purpose of towing the Mobile Field trials unit. In order to utilize the Mobile Field unit as well as to provide support to other Fieldwork it is essential that the truck be properly managed and maintained. It is also important that a schedule be maintained that allows the truck to be reserved in advance for any fieldwork requirements. It is also important that drivers be familiar with the proper operation of the truck and in proper towing techniques when required.

### **Personal vehicles**

The use of personal vehicles for fieldwork is not recommended unless the vehicle has been properly insured for work purposes. Where IOT staff wish to use their personal vehicle for transportation to and from a fieldwork location they should inform their Insurance Company of their intentions so that they are properly insured. Personal vehicles should not be used to transport IOT tools and equipment.

## **6.7 Project manger and FTT leader Responsibilities**

The responsibilities of the Project Manager of a Fieldwork project and those of the FTT leader should be clearly understood. These responsibilities be commensurate with the their authority in each particular fieldwork project.

Those responsibilities should include:

Project Manager responsibilities:

- Prepare Project Plans / approvals / funding as per IOT policy / practice
- Prepare WBS, DAS plans, instrumentation plans
- Prepare and sign off on fieldwork safety plans with assistance from FTT leader
- Identify project specific requirements for instrumentation and fund and acquire that equipment through with the assistance of other IOT groups as required.
- Prepare PO for vessel hire, vehicle hire, etc., work with FTT leader to develop specifications

FTT Leader responsibilities:

- Review and sign off on project plans, as per other facilities/groups
- Review and sign off on fieldwork safety plans
- Provide consultation / assistance to PM in developing Project Plan
- Select, in consultation with the Project Manager, Fieldwork members to participate in trails work
- Ensure the basic safety personal equipment and other "generic" equipment is available and working
- Schedule the fieldwork dates in direct consultation with PM

## **7.0 CONCLUSION**

While effort has been made to be comprehensive in looking at many aspects of fieldwork there are sure to be other aspects that have been overlooked. It is intended that the FTT team leader will take an active role in developing further recommendations or suggesting changes or amendments to these recommendations on an ongoing basis.

Given the increasing amount of fieldwork that IOT is being involved with it is recommended that IOT begin the process of implementing the recommendations given in this report as soon as reasonably possible. Doing so will provide for much more efficient projects and better management of IOT resources. Most importantly it will also better ensure that all fieldwork is done a safe and productive manner.

## **8.0 REFERENCES**

- 1) University of Guelph – Safety Policy Manual policy 851.06.04 Fieldwork
- 2) McMaster University Policy – Safety During Academic or Research Fieldwork
- 3) University of Saskatchewan Fieldwork and Travel Policy (Draft)
- 4) Marine Institute Offshore Safety and Survival Center (OSSC) Marine Emergency Duties (MED) course descriptions
- 5) Marine Institute OSSC course schedule
- 6) CSA Z275.2 –04 Occupational Safety Code for Diving Operations
- 7) CSA Z275.4 –03 Competency standard for Diving Operations
- 8) IOT Standard procedures for Ship Trials (available on web): TM-14 Propulsion Trials, TM-15 Seakeeping Trials & TM-16 Maneuvering Trials.