



The Commonwealth of Massachusetts  
Office of the Inspector General

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October 26, 2005

Steven Remsberg  
General Counsel  
Massachusetts Water Resources Authority  
Charlestown Navy Yard  
100 First Avenue  
Boston, MA 02129

Dear Mr. Remsberg:

As you know, the Office of the Inspector General has been examining the change orders on the Massachusetts Water Resources Authority's contract number 6499 - Deer Island Ancillary Modifications 1. We have examined change order and proposed change order documents provided to us by your staff in June 2005, and have been given a tour of the Deer Island Sewage Treatment Plant facilities.

On July 16, 2004, the authority gave the construction contractor the notice to proceed with the \$9.5 million contract. As of September 2005, the cost of the contract has increased by \$473,238 or 5 percent to \$9.98 million. Specifically, this letter addresses more than \$269,000 in potential cost recovery items against the design firm, Metcalf & Eddy. These items include failure to account for existing conditions and improper specifications of materials. This letter presents ten items for which we recommend cost recovery.

The following table presents each of the change orders and proposed change orders recommended for cost recovery:

**Table 1: Deer Island Contract Modifications  
Reported for Cost Recovery**

<b><u>Modification</u></b>	<b><u>Value</u></b>	<b><u>Reason</u></b>
Change Order 2: Item 3	\$9,693	Error
Change Order 3: Item 1	\$4,528	Omission
Change Order 3: Item 2	\$21,019	Error
Change Order 5: Item 1	\$54,999	Omission
Change Order 5: Item 2	\$2,702	Omission
Proposed Change Order 009	\$12,962	Omission
Proposed Change Order 010	\$120,000	Error
Proposed Change Order 022	\$ 32,258	Error
Proposed Change Order 023	\$ n/a	Omission
Proposed Change Order 024	\$10,842	Error
<b>Total</b>	<b>\$269,003</b>	

### **Change Orders**

**Change Order 2, Item 3: \$9,693** - The contract documents prepared by the designer called for installation of three three-quarter inch electrical conduits in the Winthrop Terminal facility. However, the specified conduit route was already heavily congested. This change order called for the contractor to by-pass the congested area. This by-pass required a larger and longer, one-and-one-half inch electrical conduit, and an additional pull box. This was an existing condition that should have been observed by the designer and included in the contract design documents; therefore this change order is a result of an error in the contract specifications.

**Change Order 3, Item 1: \$4,528** – The contract called for the replacement of existing isolation valves on two Dystor tanks as well as a spare isolation valve. The contract documents, however, did not provide for installation of position indicators on each of the isolation valves or the connection of these position indicators to the Process Information Control System (a component of the plant's computerized operations and maintenance system). The previous isolation valves did have position indicators that were connected to the Process Information Control System. The designer should have provided for position indicators in the design of the valve replacements. This change order was a result of an omission in the contract documents.

**Change Order 3, Item 2: \$21,019** - The contract documents specified the use of rubber gasket material at flanged connections in the digester gas piping system. However, the construction code in effect at the time of the design required the use of a fire resistant gasket material at these types of connections. As a result the type of gasket material had to change through a change order. Cost recovery should be pursued on this issue as the design contractor did not specify the correct material in the design documents.

**Change Order 5, Item 1: \$54,999** - The contract documents called for the provision of digester gas line isolation valves. However, the documents failed to include an isolation valve on the main digester gas line between the digester complex and the rest of the plant. This type of isolation valve is necessary to meet both the safety and maintenance requirements of the plant. Therefore, this is an omission by the designer, as this isolation valve should have been included in the design documents.

**Change Order 5, Item 2: \$2,702** - This modification required the contractor to provide a ground penetrating radar specialist to locate conduits embedded in existing concrete walls. The existing as-built drawings did not reflect the specific locations of the embedded conduits. A previous authority contract (6537 – Deer Island Ancillary Modifications 3-1) had a similar problem and the designer (Metcalf & Eddy) included the use of a ground penetrating radar specialist in the contract specifications. Therefore, the designer should have been aware of the need to include the provision of a specialist on this contract as well.

### **Proposed Change Orders**

At the time of this office's review of contract change orders; there were also several pending change order proposals. This office recommends that the authority consider pursuing cost recovery against the design consultant for these proposed change orders as well.

**Proposed Change Order 009: \$12,962** - The contract documents call for the use of galvanized rigid conduit in the primary scum screen room. However, this type of material is not suitable for a corrosive environment such as in the primary scum screen room. The contract documents should have specified corrosion resistant materials, such as PVC coated conduit and fiberglass supports. This change order resulted from an omission by the design consultant.

**Proposed Change Order 010: \$ 120,000 (est.)** - The overflow boxes for the digesters in one of the modules are a different shape than the others. As a result, these overflow boxes have more surface area and require additional corrosion resistant coating work. Contract documents did not specify a difference between the overflow boxes and therefore did not require the additional corrosion resistant coating. This proposed change order is a result of the designer omitting this requirement.

**Proposed Change Order 022: \$ 32,258** - The contract documents called for the replacement of the existing pipe supports in the residuals scum screen room, but did not call for necessary additional supports. The documents should have called for the installation of additional pipe supports under existing nozzle connections. Equipment nozzles are not designed to take pipe loads, therefore pipe supports were needed in this location. The design contractor should have been aware of this practice, therefore this change order is a result of designer omission.

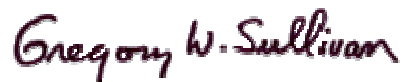
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**Proposed Change Order 023: \$ n/a** - This modification required the contractor to provide a ground penetrating radar specialist to locate pipe penetrations in existing concrete. As with Change Order 5, Item 2, the existing as-built drawings do not reflect the locations of embedded conduits. In order to avoid cut conduits during construction, ground penetrating radar may be used to locate the embedded conduits. A previous Authority contract (6537 – Deer Island Ancillary Modifications 3-1) had a similar problem and the designer (Metcalf & Eddy) included the use of a ground penetrating radar specialist in the contract specifications. Therefore, the designer should have been aware of the need to include the provision of a specialist on this contract as well.

**Proposed Change Order 024: \$10,842** - Contract documents specified a disconnect switch for each of the primary scum screens that was not in accordance with the electrical requirements of the screens' two-speed motors. Without the proper disconnect switches, the motors will not operate as intended. The designer should have specified the proper disconnect switches and associated wiring in the contract documents.

I recommend that the matters discussed in this report be pursued for cost recovery against the design consultant. My staff is available to assist you in any continuing examination of this or any other issue. Please contact Neil Cohen, Deputy Inspector General, if you need further assistance.

Sincerely,



Gregory W. Sullivan  
Inspector General

cc: John Navoy, Massachusetts Water Resources Authority  
Daniel O'Brien, Massachusetts Water Resources Authority