EarthTech
A Tyco International Ltd. Company

MEMO

Date: January 17, 2005

To: Gordon Brown

From: Hsien Chen / Chris Cavers & Bill McClenney

Subject: **MCAS El Toro IRP Site 1 Further Perchlorate Investigation Tasks, Remedial Investigation (RI) Tier III-D**

INTRODUCTION

This memorandum summarizes additional perchlorate investigation proposed for Tier III-D of the Remedial Investigation at IRP Site 1. The primary objective of this phase of the RI is to further assess the lateral and vertical distribution of perchlorate between IRP Sites 1 and 2, to assess the potential existence of paleochannels in the recent alluvial sediments in the wash between the two sites (if any), and to provide screening data for the possible future siting of groundwater monitoring wells (if necessary). The proposed additional investigation are based on results obtained during recent work at the site (Tier III-C of the RI) and summarized in a January 17, 2005 memorandum to Gordon Brown entitled "Remedial Investigation Tier III-C Assessment Results, IRP Site 1, Former MCAS El Toro".

PROCEDURE

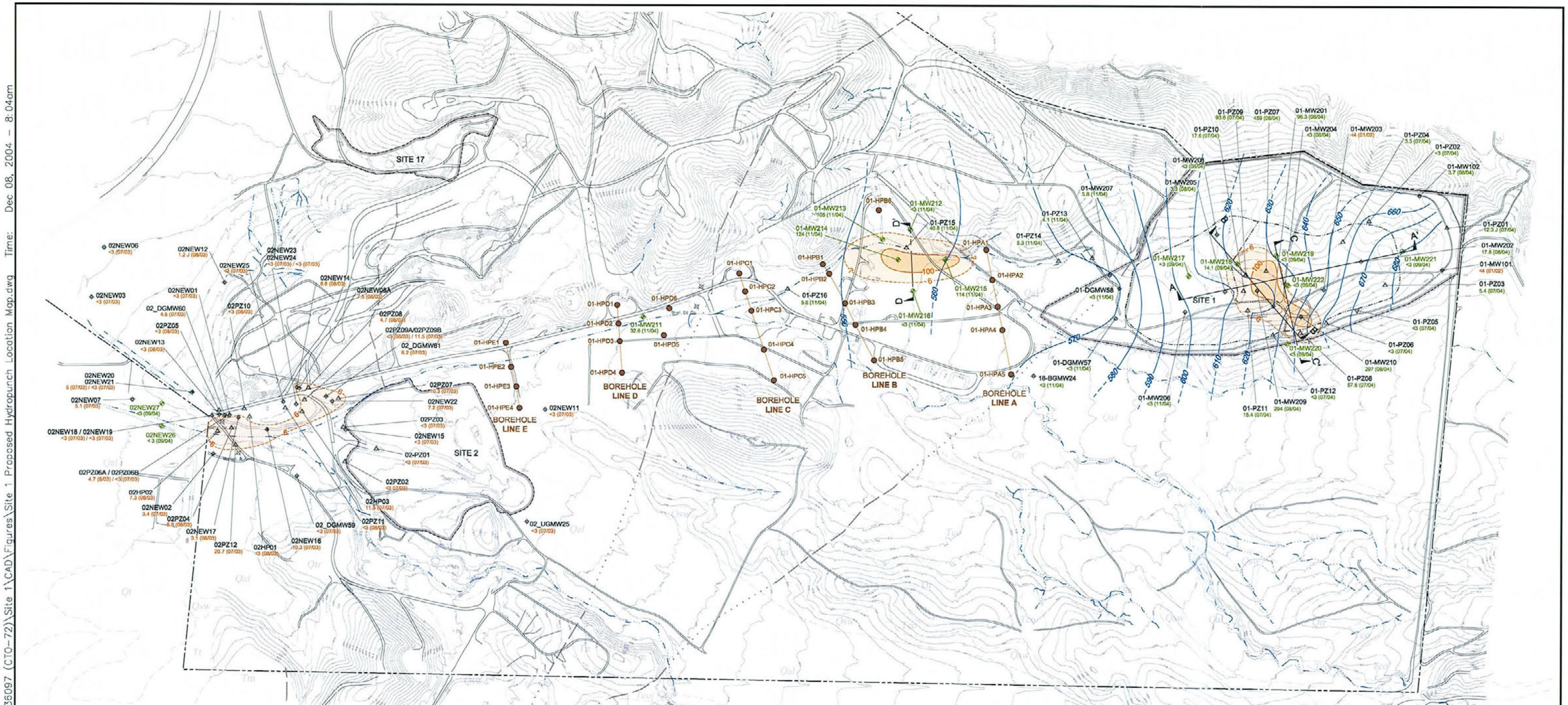
We will implement the following tasks:

- A series of Hydropunch™ boreholes will be arranged as lines transverse to flow along the wash between Sites 1 and 2 (see Figure 1). The primary purpose is to provide additional information on extents of perchlorate presence in the vicinity of known occurrences, and the secondary purpose is to assess the local geology to better predict flowpaths through the alluvium in the wash. These lines of boreholes will consist of four to five continuously cored hollow-stem auger (HSA) penetrations arrayed in lines crossing the wash to provide reasonable resolution across this aquifer. The boreholes will proceed with continuous coring to first encountered groundwater. After groundwater is encountered, a sample of the groundwater will be collected via Hydropunch™. After sufficient groundwater sample has been withdrawn, the borehole will be further advanced until the feldspathic sandstone bedrock is encountered. Each core will be logged for both soil type (by USCS) and characteristics such as reactivity with hydrochloric acid (HCl) and bedrock depth. Coring will continue to an approximate depth of 5-10 feet within the weathered bedrock. At two locations along each line of boreholes, an attempt will be made to obtain a sample of groundwater within the weathered bedrock matrix to assess the vertical distribution of perchlorate. Such samples will be collected through unconducted holes so some mixing with alluvial groundwater may occur. If Hydropunch™ refusal is encountered, the auger will be backed out a few feet to allow an attempt to collect a bailed groundwater sample through the augers.

- Five lines of boreholes will be advanced to collect this information along the wash between Site 1 and Site 2 (see Figure 1). Borehole Line A provides information between the southern Site 1 boundary and the detections arrayed near Monitoring Well 01-MW215. Borehole Line B will be arrayed downgradient of the well cluster associated with 01-MW215. One additional borehole (01-HPB6), which will be associated with Borehole Line B, will be advanced north of Monitoring Well 01-MW213 to further delineate perchlorate concentrations in that area. Borehole Lines C, D, and E will be properly spaced along the wash to just north of Site 2. To further delineate perchlorate concentrations near Monitoring Well 01-MW211, two additional boreholes (01-HPD6 and 01-HPD7) will be advanced, which will be associated with Borehole Line D.

- Expedited laboratory perchlorate analyses will be performed for water samples collected during the latter part of the Hydropunch™ sampling events. The purpose is to be able to evaluate the perchlorate distribution data in time for selection of suitable groundwater monitoring well locations, if necessary, to enhance the schedule for preparing the upcoming Site 1 Remedial Investigation (RI) report. If new wells are installed, laboratory analyses for groundwater samples collected from the wells will include general chemistry and nitrate for the purposes of constructing a Piper trilinear diagram to aid in water quality evaluation.

- Assessment of the vertical gradient and the hydraulic conductivity of the alluvium may also need to be evaluated. In both instances, this information will be more useful if obtained in the locations where it may best be used for groundwater remediation feasibility study. We recommend assessing perchlorate distribution information in both the alluvium and the weathered bedrock groundwaters via the lines of Hydropunch™ boreholes (all continuously cored) prior to selecting a location or locations where aquifer stress testing be performed. As this testing is likely to require either wells or piezometers screened in both hydraulic units to generate data to confirm the conceptual site model for future remedial feasibility study and system design. An aquifer stress test averages conductivity across such variable stratigraphy providing an aggregate value for horizontal hydraulic conductivity that can be used to design capture zones.



LEGEND:

01-HPA5	PROPOSED HYDROPUNCH SAMPLING LOCATION
01-MW219	NEWLY INSTALLED GROUNDWATER MONITORING WELL (CONTINUOUS CORE COLLECTED)
550	GROUNDWATER CONTOUR ELEVATION, DASHED WHERE INFERRED (GROUNDWATER ELEVATIONS COLLECTED ON NOVEMBER 5, 2004)
01-MW209	EXISTING GROUNDWATER MONITORING WELL
01-PZ11	EXISTING PIEZOMETER
459 (08/04)	PERCHLORATE CONCENTRATION (MONTH AND YEAR INDICATED) GREEN INDICATES RECENT DATA
J	INDICATES ESTIMATED VALUE
	MCAS EL TORO BOUNDARY
	EOD RANGE BOUNDARY
	IRP SITE BOUNDARY (1, 2, AND 17)
	STREAM OR WASH (INTERPOLATED FROM TOPOGRAPHIC DATA)
	EXISTING FENCE
6	INFERRED PERCHLORATE ISO-CONCENTRATION CONTOUR ABOVE 6 µg/L (BASED ON NOVEMBER 2004 SAMPLING AND PREVIOUS ROUNDS). QUERIED WHERE UNCERTAIN
100	INFERRED PERCHLORATE ISO-CONCENTRATION CONTOUR ABOVE 100 µg/L (BASED ON NOVEMBER 2004 SAMPLING AND PREVIOUS ROUNDS)
	GEOLOGIC FAULT, DOTTED WHERE INFERRED
C C'	CROSS-SECTION LOCATION

DESCRIPTION OF MAP UNITS:

Qal	Flood Plain and Stream Channel Deposits (Holocene and Late Pleistocene)
Qsw	Sheetwash Deposits (Holocene to Middle Pleistocene)
Qtr	Trail Ridge Sands (Pleistocene)
Tn	Niguel Formation
Tco	Oso Member
Tm	Monterey Formation (Miocene)
Tt	Topanga Foundation (middle Miocene)
Tvs	Sespe and Vaqueros Formations

DRAFT
FOR DISCUSSION PURPOSES ONLY

FINAL REVIEW PENDING

Phase II RI — Tier III-C Perchlorate Investigation Memo

Site 1
Proposed Hydropunch Sampling Location Map

Date: 01-05	Former MCAS El Toro	Figure
Project No. 36097	EarthTech — A Tyco International Ltd. Company	1

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DOCUMENT TRANSMITTAL

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Naval Facilities Engineering Command
Southwest Division
Mr. Gordon Brown
1230 Columbia Street, Suite 870
San Diego, CA 92101-8517

DATE: January 20, 2004
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LOCATION: MCAS, El Toro

FROM: Hsien W. Chen

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