

## Minutes (Draft) of the Third Meeting of the Committee on Utilization of Seawater in Concrete Construction

■ Date: 15:00 to 17:00, Tue, Mar 5, 2013

■ Place: JCI Conference Room

■ Attendees: Nobuaki Otsuki (Chair), Hidenori Hamada (Vice Chair), Nobufumi Takeda (Administrator), Keiichi Imamoto (Administrator), Toru Yamaji (Administrator), Takashi Habuchi (Administrator), Yoshikazu Akira (member), Keisaburo Katano (member), Kazuya Koga (member), Takumi Sawada (member), Yasuhiro Dan (member), Kazuto Fukudome (member), Seiji Funahashi (member), Eiji Matsuo (member), Minoru Yaguchi (member), Yutaka Tadokoro (Correspondent), Takahiro Nishida (minutes keeper)

JCI Secretariat: Ryo Okada

### ■ Handouts

3-0 Proceedings (Draft) of the Third General Meeting

3-1 Minutes (Draft) of the Second General Meeting

3-2 Progress Reports of WG1

3-3-1 Minutes (Draft) of the 4th WG2+WG3 Meeting

3-3-2 Kagoshima Harbor Exposure Test Specimens

3-3-3 Contents (Draft) of WG2+WG3

3-4-1 Minutes (Draft) of the 4th WG4 Meeting

3-4-2 Contents (Draft) of WG4

3-5 Minutes (Draft) of the Third Administrators meeting

3-6 JCI study group reports: Activity Report

3-7 Fiscal year 2013 Activity Program and Fiscal year 2012 Activity report

### ■ Proceedings

#### 1. Greeting by the Chair

The Vice Chair, Prof. Hamada and the Chair, Prof. Otsuki, greeted the membership prior to the committee meeting.

## 2. Confirming Minutes of Last Meeting

Dr. Nishida explained the minutes of last committee according to the handout 3-1.

## 3. Report from each Working Group

### WG1 (Survey Group)

According to Handout 3-2, Prof. Hamada reported progress of WG1.

(1) Collecting and collating research results concerning Hashima (Gunkan Jima) in Nagasaki City.

→ Dr. Habuchi contributes papers related to field survey of Hashima to JCI annual conference. These contents will be summarized in the final report of this committee. There are still some samples taken from Hashima and those will be analyzed.

(2) Collecting and collating information on existing facilities such as lighthouse facilities built with seawater-mixed concrete.

(3) Drawing up survey and test plans for existing structures.

→ The adjustment about investigation in Tottori Tajiri Harbor is discussed. It is necessary to ask Tottori Prefecture collection of the core specimen. These adjustments have been requested to Dr. Yamaji.

(4) Collecting and collating case studies of chloride-induced damage attributable to sea sand in the Okinawa area.

→ According to references, Dr. Ohta and Mr. Sawada are investigating. Especially, the factors promoting the deterioration will be analyzed.

(5) Collecting and collating other countries' codes and standards concerning mixing concrete with seawater.

→ It is just going to collate about overseas results of an investigation now. It is due to discuss about the collated result in next WG.

(6) Conducting research on technologies for utilizing magnesium.

→ Magnesium has the results used as a reaction accelerator or an admixture for plasterers (dolomite etc.). The effective use method of magnesium is investigated.

(7) Collecting case studies in other countries of the use of special mixing water other than seawater.

→ In the range which can be exhibited, the examples which use sea water

for mixing water are collected.

(8) Collecting information about the influence which seawater has on ASR.

→ There is little information about ASR. Therefore, experimenting next year is also putting into the view.

Discussions related to WG1 activities:

- About the influence of ASR, it is necessary to clarify the amount of alkali of seawater mixed concrete and the acceptable amount of alkali in case of using fly ash etc. (Prof. Otsuki)

→ In the present standard, there is a regulation value of 0.75% in  $\text{Na}_2\text{O}$  equivalent amount to cement content. However, the relation between admixture content and acceptable amount of alkali is not arranged. (Dr. Dan)

- Does utilizing magnesium mean solidification of the magnesium (dolomite plaster, for example)? (Dr. Takeda)

→ A plasterer can be made by containing magnesium. Thus, I would like to summarize the effect which leads to the advantage of sea water mixed concrete. (Dr. Koga)

- WG4 is also collecting information about (7). I would like to use it, if the result is utilizable. (Dr. Habuchi)

→ What are being collected is only an example which uses sea water. Evaluation after collection is not carried out. Therefore, it is unknown whether it is how much useful.

→ At least the description of the information about the situation where sea water had to be used is useful. (Prof. Hamada)

WG2 (Evaluation Group) & WG3 (Performance Improvement Group)

According to Handout 3-3-1 to 3-3-3, Dr. Takeda and Dr. Yamaji reported progress of WG2 & WG3.

Dr. Takeda explained that the papers of the considerable number are collected, and according to handout 3-3-3, the contents are arranged.

Dr. Yamaji and Dr. Nishida explained the outline of the concrete test specimen exposed to the Kagoshima harbor for 27 years and the analysis schedule of it. It is under adjustment so that Dr. Saitou, Dr. Minagawa and Dr. Nishida can share analysis and experiments. If there are experiments to do etc., the contents and necessary quantity will be connected to Dr.

Nishida by March 15.

Discussions related to WG2 & WG3 activities:

- According to the experiment in the current fiscal year, the stainless reinforcement was a tendency which is not corroded unless it is exposed to considerable severe environment. About the stainless reinforcement in sea water mixed mortar, if OPC is used even if exposed to carbonation environment, there is a result that it will not corrode. Moreover, according to the old experimental result, it is thought that concentration of the chloride ion by carbonation is to about 2 times of an initial content at the maximum. If there is an experimental result whose amount of concentration is more than 2 times the initial content, I will want you to introduce. (Prof. Otsuki)
- The February, 2012 issue of a magazine “Concrete Engineering” has the following description. “When using a stainless reinforcement, it is necessary to fully consider the influence which it has on durability, such as corrosion by contact with dissimilar metal. The durability of a stainless reinforcement is a research way. Therefore, without verification in consideration of local conditions, it is good to thicken the minimum cover like the case where covering reinforcement is used.” It is necessary to advertize more the result of research about the durability of a stainless reinforcement. (Prof. Otsuki)
- In Port and Airport Research Institute, data is taken about the influence of the corrosion between dissimilar metal of a stainless reinforcement. About the result, it is remembered that it was a report that there was not problem. (Dr. Takeda)
- About analysis of the test specimen exposed in the Kagoshima harbor, if the absolute quantity of elements, such as magnesium, compares, I will think that X-ray fluorescence will be effective. (Dr. Akira)

WG4 (Manufacturing and Construction Working Group)

According to Handout 3-4-1 and 3-4-2, Dr. Habuchi (administrator) reported progress of WG4.

Now, information is collected about the sea water use track record in ready-mixed concrete plant, the hearing to the plant maker of NA Crete and the method of the construction test in the Soma harbor.

Discussions related to WG4 activities:

- It is better to also add the example of the other company about actual construction, if it is not only in the example of the Soma harbor. (Prof. Otsuki)

→ Each company gathers information.

- About the influence of the chloride ion in concrete rubble from Tohoku earthquake disaster, in the experiment by the concrete which mixed concrete rubble ground to about R40, it is checking that there is not problem about chloride content. (Dr. Takeda)

- Is the concrete of Gunkan Jima sea water concrete? (Dr. Takeda)

→ Since there is what has a very high concrete chloride content, it can presume that they are sea water and sea sand mixed. However, a decision is impossible. (Dr. Imamoto)

- Can't it distinguish by analyzing magnesium and other elements? (Prof. Otsuki)

→ Since the ingredient ratio of the dolomite contained in concrete is known, I think that it is distinguishable from magnesium of sea water origin. About this, related references are sent to Dr. Imamoto. (Dr. Koga)

#### 4. Report from administrators meeting

Prof. Otsuki explained about the handout 3-6 and 3-7 submitted to a JCI Study Group.

According to handout 3-5, Dr. Nishida explained Minutes of the last administrators meeting. Especially, in the debriefing session in 2014, there was explanation that symposium would be due to be put side by side I want you to contribute a paper. In the architectural field, since the image negative about sea water use concrete is strong, in order to collect a broader participant, it is necessary to device a subtitle. There was a request if there is an good idea, that I will want you to take out.

#### 5. Others

Dr. Takeda explained about the construction test of prepacked/postpacked concrete that use concrete rubble from Tohoku disaster in Soma harbor.

Discussions:

- How is compacting prepacked concrete? (Dr. Funahashi)
  - Form vibrator was used. (Dr. Takeda)
- What is the design strength? (Prof. Hamada)
  - It is  $18\text{N/mm}^2$  (Dr. Takeda)
- How was the formwork done? How was the filling pipe of mortar set? (Dr. Matsuo)
  - Where a mold is opened, concrete rubble was manually supplied to the half, the mold was closed, and concrete rubble was put in to the upper part. The percentage of absolute volume is about 50. Only one filling pipe was installed in the central part. (Dr. Takeda)
- It is thought that aluminum powder has an effect also in drying shrinkage reduction. Is volume change measured? (Dr. Koga)
  - In this test, the purpose of aluminum powder is filling an unfilled part as foaming agent. Volume change will be considered from now on. (Dr. Takeda)
- It is better to cure under the sea, when the reduction of incidence of a form and the measure against initial frost damage at early age is considered. (Prof. Otsuki)

A future schedule is as follows.

Administrators' meeting : around May (details TBD)

WG1 meeting : 14:00-17:00, May 9, 2013

WG2 & WG3 meeting : 15:00-17:00, May 21, 2013

WG4 meeting : 10:00-12:30, May 28, 2013