

PT. SUCOFINDO

Summary Report

The Republic of Indonesia

Verification Survey with the Private Sector  
for Disseminating Japanese Technologies  
for Improvements and Upgrading of  
Inspection Technique on Industrial  
Infrastructure Equipment

April, 2017

Japan International Cooperation Agency

Chugai-technos Corporation



## 1. BACKGROUND

The Republic of Indonesia has invested huge amount of money in industrial infrastructures since the 1970's.

The Master Plan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI) from 2010 to 2025 shows that Indonesia will continue to invest in its infrastructure. Yet, some infrastructures such as oil refineries and chemical plants constructed in the 1990s and those are at the stage of retrofits and rehabilitations. Thus the maintenance and safety of oil and gas pipelines and various manufacturing factories in particular, are one of the most urgent issues to be addressed in the current situation since oil and gas play a significant role in Indonesia in terms of exports.

Under such background, in the study conducted in 2013, it is confirmed that preventive maintenance inspection techniques which Chugai-technos provides can contribute to infrastructures and engineering skill development in Indonesia. The Survey conducts pilot projects aiming for the improvement of preventive maintenance inspection skills and raising the awareness of such skills through installing non-destructive test (NDT) method using Scale Checker (SC) developed by Chugai-technos.

## 2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

### (1) Purpose

The purpose of the Survey is to improve and upgrade the inspection techniques on industrial infrastructure equipment by installing NDT method using the SCs and other testing equipment. Through this survey, the concept of the importance of preventive technique and conservation activities will be recognized to SUCOFINDO and other institutions connected with industrial infrastructure.

### (2) Activities

Activities 1: Disseminating activities of NDT

- 1-1) To introduce the SC to SUCOFINDO.
- 1-2) To disseminate the application of the SC and necessary inspection plan and techniques for preventive maintenance to SUCOFINDO's inspectors through inspection trainings in Indonesia.
- 1-3) To implement trainings in Japan for SUCOFINDO's inspectors, for the purpose of sharing NDT, including of planning, inspections and data analysis, on preventive maintenance.
- 1-4) To implement and instruct pilot inspections with applying the SC at pilot plants

in Indonesia. The pilot plants have been selected among the refineries owned by PERTAMINA and leading chemical plants which are the major client of SUCOFINDO.

Activities 2: Verification and Dissemination activities on the utility of NDT utilizing the SC

- 2-1) To confirm the utility of the SC through the Activities 1-3. Feedback is obtained through the Activities and used to specify the required specifications for the SC to disseminate in Indonesia.
- 2-2) To explain the characteristic and utility of the SC to APITINDO (an association of local inspection companies) and confirm a potential of dissemination in Indonesia.
- 2-3) To understand the potential demand of NDT by utilizing the SC and of purchasing the SC, etc., and research/consider the prior target and measures to disseminate.

Activities 3: Dissemination activities for preventive maintenance and NDT

- 3-1) To provide information about Japanese law systems and regulations of preventive maintenance to regulatory decision makers of the relevant directorate of the Ministry of Energy & Mineral Resources that are currently reviewing to enact preventive maintenance regulations in Indonesia. The information has been provided through workshops. In this way, the significant concept of preventive maintenance has been shared by the upper class of the government. The government can expand the concept into Indonesia.
- 3-2) To hold workshops for plant owners to explain the reality and preventive maintenance merits of the middle and long term operations in Japan. As a result, the concept and knowledge of the dissemination can be ensured.
- 3-3) To examine future cooperation candidates for equipment sale and inspection service business and its sharing roles and clarify work flow. The dissemination of NDT service is researched and considered as well.

(3) Information of Product/ Technology to be provided

- 1) SC: to inspect the residues in the pipe of oil refineries and other chemical plants with weak radiation. The equipment introduced in Table 1 has been developed by Chugai-technos.

Table 1: Outline of SC

Product name	Scale Checker (SC)	
Specification	Radiation source (Cs137)	3.7 MBq (Mega Becquerel) x 1 Radioactive half-life period: 30 years Energy: 0.66 Mev (Million electron volts)
	Device	Detector approx. 10kg, 330×330×140H (mm)
	Driving Device	Motor Drive up to 24B (without fluid) (Pipes up to 24 inches)
Features	<p>SC is an inspection tool which allows inspectors to examine the inside of oil and gas pipes from outside by transmitting feeble radiation.</p> <p>Main features are as follows:</p> <ul style="list-style-type: none"> <li>- to measure the scale inside pipes from outside without stopping plant operation</li> <li>- portable inspection device which is adequate for multi-inspection</li> </ul> <p>This device occupies 70% market share in the whole of Japan whereas the sales result abroad is small quantity so far.</p>	
Comparison of SC with other devices	<p>SC has the following properties;</p> <ul style="list-style-type: none"> <li>- to inspect without stopping plant operation,</li> <li>- portable system,</li> <li>- to image the measured data on site, and</li> <li>- to utilize Cs137 for radiation source which is more feeble and safer than others.</li> </ul>	
Sales performance	<p>Domestic: 103 units (oil and chemical plants)</p> <p>Overseas: 5 units in China, Australia, Tanzania and Indonesia (for Japanese companies)</p>	
Size	Detector 10kg, 330×330×140H (mm)	
Installation site	Installation is not required.	
Quantity for this verification survey	3 units	

2) The necessity of NDT for preventive maintenance: it can inspect future defects and malfunctions before stop operating facilities.

#### (4) Counterpart Organization

Indonesian Side: SUCOFINDO

Coordination Committee: For the effective implementation of the Survey, Coordination Committee will be formed by the following members: Chugai-technos Corp, JICA, SUCOFINDO and The Ministry of Industry and The Ministry of Energy and Mineral Resources.

This project will be implemented by the organizations as shown in Table 2.

Table 2: Respective Roles by Organizations

Activities		Chugai-technos	Deloitte	System Science Consultants	Shinko Plantech	Yokohama National Univ.	SUCOFINDO
Verification	Marketing survey	Planning and Implementation	Support for planning and implementation	-	-	Market evaluation	Making appointments
Dissemination	Training in Indonesia and Japan	Planning and Implementation	-	Support for planning and implementation	Support for Implementation	-	Attending lectures
	Workshop	Planning and Implementation	-	Support for planning and implementation	Lecturer	Lecturer	Attendance and assistance
Coordination Committee		Planning and Implementation	-	Support for planning and implementation	-	-	Attendance and assistance

(5) Target Area and Beneficiaries

Target Area: Jakarta, Cilacap, Balikpapan

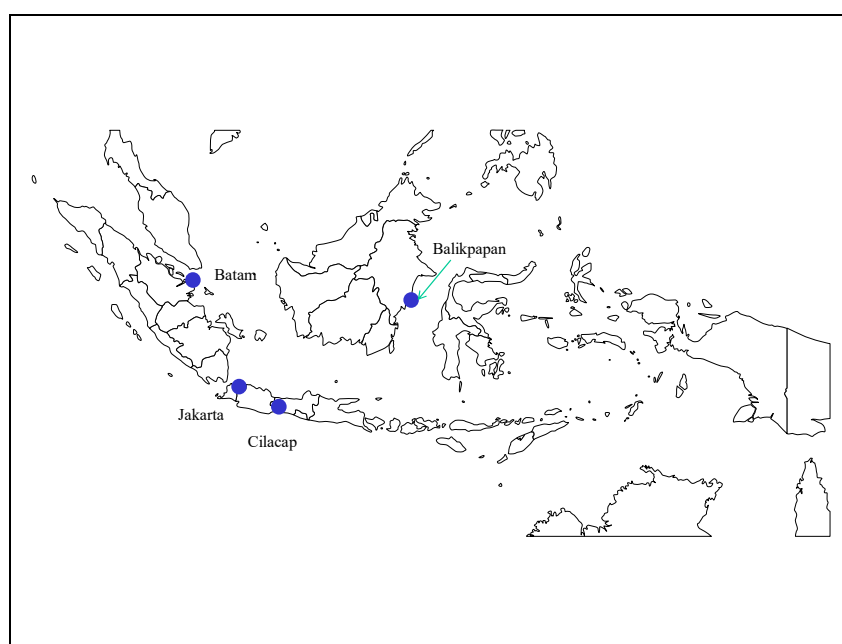


Figure 1: Target Area

Beneficiaries: Officials of SUCOFINDO, APITINDO, the Ministry of Industry, the Ministry of Energy and Mineral Resources

(6) Duration

From January 2015 to May 2017

## (7) Progress Schedule

Table 3: Progress Schedule

Activities		2015												2016												2017					
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Activities 1: Disseminating activities of non-destructive inspection techniques																															
1-1) To introduce the Scale Checker to SUCOFINDO.	Plan																														
	Actual																														
1-2) To disseminate the application of the Scale Checker and necessary inspection plan and techniques for preventive maintenance to SUCOFINDO's inspectors through inspection trainings in Indonesia.	Plan																														
	Actual																														
1-3) To implement trainings in Japan, for SUCOFINDO's inspectors, for the purpose of sharing non-destructive inspection techniques, including of planning, inspections and data analysis, on preventive maintenance.	Plan																														
	Actual																														
1-4) To implement and instruct pilot inspections with applying the Scale Checker at pilot plants in Indonesia. The pilot plants will be selected from the refineries owned by PT. Pertamina or leading chemical plants which are the major client of SUCOFINDO.	Plan																														
	Actual																														
Activities 2: Verification and Dissemination activities on the utility of non-destructive inspection techniques utilizing the Scale Checker																															
2-1) To confirm the utility of the Scale Checker through the Activities 1-3. Feedback is obtained through the Activities and used to specify the required specifications for the Scale Checker to disseminate in Indonesia.	Plan																														
	Actual																														
2-2) To explain the characteristic and utility of the Scale Checker to APTINDO (an association of local inspection companies) and confirm a potential of dissemination in Indonesia.	Plan																														
	Actual																														
2-3) To understand the demand of non-destructive inspection by utilizing the Scale Checker and of purchasing the Scale Checker, etc, and research/consider the prior target and measures to disseminate.	Plan																														
	Actual																														
Activities 3: Dissemination activities for preventive maintenance and non-destructive inspection																															
3-1) To provide information about Japanese law systems and regulations of preventive maintenance to regulatory decision makers of the relevant directorate of the Ministry of Energy & Mineral Resources that are currently reviewing to enact preventive maintenance regulations in Indonesia. The information will be provided through workshops. In this way, the significant concept of preventive maintenance will be shared by the upper class of the government. The government can expand the concept into Indonesia.	Plan																														
	Actual																														
3-2) To hold workshops for plant owners to explain the reality and preventive maintenance merits of the middle and long term operations in Japan. As a result, the concept and knowledge of the dissemination can be ensured.	Plan																														
	Actual																														
3-3) To examine future cooperation candidates for equipment sale and inspection service business and its sharing roles and clarify work flow. The dissemination of non-destructive inspection service is researched and considered as well.	Plan																														
	Actual																														

Legend: Domestic work Field work

## (8) Manning Schedule

Table 4: Manning Schedule

Responsibility	Name	Company	Plan/ Actual	2015												2016												2017					Total	
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Site	Domestic
Project leader	Etsubo Kami	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	2.80	2.20
Market creation C/P Training	Masahiko Takawa	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	2.75	5.50
Market creation C/P Training	Shotaro Ishitaka	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
C/P Training	Hideki Sato	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.17	0.05
C/P Training	Yasuhiko Shoyama	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	2.43	2.20
C/P Training	Shigeru Kato	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.27	0.40
C/P Training	Junichi Kono	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.73	2.20
C/P Training	Yuji Shibata	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	2.43	2.95
C/P Training	Yuji Iida	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.73	2.20
Market creation	Yoshiaki Iizuka	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.10	2.75
Workshop Committee	Yuka Matsubara	Ohugai-Technos	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.37	2.20
Chief advisor	Masatoshi Hoshimoto	Deloitte Touche Tohmatsu	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
Business development	Hiroshi Fujiwara	Deloitte Touche Tohmatsu	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.73	0.73
Business development	Tsunetoshi Horie	Deloitte Touche Tohmatsu	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
Project promotion(1)	Mehio Kanda	System Science Consultants	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.27	0.30
Project promotion(2) Training planing(1)	Shinichiro Takeda	Carbon Free Consulting	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
Training planing(2)	Aiko Kaiho	System Science Consultants	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.13	0.20
C/P Training Workshop support	Yusaki Sasaki	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.07	2.20
C/P Training Workshop support	Jun Kobayashi	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	1.13	1.28
C/P Training Workshop support	Kazuhiko Tsuno	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.67	2.20
C/P Training Workshop support	Yuji Terasawa	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.20	3.80
C/P Training Workshop support	Shoichi Muraoka	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
C/P Training Workshop support	Takumi Sakagami	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.23	2.10
C/P Training Workshop support	Hanako Kubo	Shinko Plantech	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.00
Workshop and Committee support	Naoya Kasai	Yokohama National University	Plan/Actual	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	0.00	0.05
Field work Domestic work																																	0.27	0.10
																																	0.23	0.93

## (9) Implementation System

The installation of SCs was completed in November 2015. Such tools were stored in the Head Office of the SUCOFINDO and distributed to each location after the pilot inspection was completed alongside the local training at the Cilacap and Balikpapan branches. Table 5 is a list of implemented location.

Table 5: A list of implemented location

System	unit	date	Implemented location
SC	3	Nov. 2015	SUCOFINDO Head Office
			SUCOFINDO Cilacap Branch
			SUCOFINDO Balikpapan Branch



### 3. ACHIEVEMENT OF THE SURVEY

#### (1) Outputs and Outcomes of the Survey

##### 1) Verification and Dissemination Activities

The SCs were shipped and arrived in Indonesia at the end of November 2015. On the other hand, there was a delay in the purchasing of the radiation source necessary for SC, but as a result it was obtained at the end of January 2016, and implementation was completed.

After the local implementation of SC, local training were conducted in February 2016 (Jakarta), July 2016 (Cilacap), and September 2016 (Balikpapan). There were total of 38 participants, which exceeded the expected number of 30 participants. Active questions and answers were conducted between the instructors on the Japanese side and the SUCOFINDO inspectors, and there was a high expectation for the SC. A survey for comprehensibility check was conducted, and the “How to Use SC and the Transfer of NDT technology” was completed for all participants.

Regarding implementation of training activities in Japan, the dates were changed upon taking into consideration the SUCOFINDO’s request, and the activities were implemented two times. The targeted “Technology Transfer regarding Advanced Inspection/Data Analysis for the Preventative Maintenance for Plant Owners for the Management Class and Inspection Leaders” was completed for 10 people.

The PERTAMINA refinery in Cilacap was chosen as the location for the pilot inspection. The pilot inspection was a joint coordination among PERTAMINA staff, local inspectors at the SUCOFINDO, and the JICA team. On the other hand, the pilot inspections in Jakarta and Balikpapan were conducted for pipes in buildings.

Furthermore, a workshop (WS) for plant owners was held on April 20<sup>th</sup>, 2016, and a total of 8 companies (14 people) participated. Of the 8 companies, 5 companies expressed interest in SC demonstration inspection for within its own plants.

Additionally, a workshop was conducted for APITINDO (Association of Technical Inspection Companies in Indonesia) on April 21<sup>st</sup>, 2016, of which 17 companies (23 people) participated. The participants from the APITINDO member companies expressed their high expectations for SC. The workshop for policy decision makers was held on February 22<sup>nd</sup> 2017 jointly with SUCOFINDO targeting ESDM.

Photos from the workshop for policy decision makers is shown on Figure 2.



	
workshop for policy decision makers and exhibition of SC	Introduction of our activities

Figure 2: Workshop for policy decision makers

## 2) Business Expansion Plan

Research on market size, potential customers, market price, competing products, and regulations and design of business models were conducted. The results of the business model plan are as follows:

- The SC sales entered into a distributorship agreement with SUCOFINDO EPISI
- Upon negotiations with the SUCOFINDO, a comprehensive MOU was signed regarding NDT Services. The results are laid out on the company website as shown in Figure 3



Source: Company website (<http://www.chugai-tec.co.jp/article/show/id/94.html>)

Figure 3: Collaboration Agreement signed with SUCOFINDO

## 3) Outcome

The safety and reliability of the industrial infrastructure equipment such as piping etc. may directly lead to a socioeconomic interest, and in order to maintain safety, it is necessary to maintain industrial infrastructure products and equipment reliability.

It is important to conduct periodic inspections to prevent accidents. On the other hand, periodic inspections require a temporary halt in operations, which leads to socioeconomic loss.

In order to implement inspection for products and technology without halting operations in addition to promoting such products and technology, an industry infrastructure risk measures and preventative maintenance must be universalized, and education on policy and the industry is also necessary.

Indonesia is similar to Japan in that they both are within the Pacific Rim earthquake zone, and carry the potential risk of accidents occurring in refineries and processing plants due to natural disasters. Also, in daily operation, there are risks in deterioration of facilities and explosion of pipelines, and carry a potential in not only in threatening the daily lives of neighboring residents, but also negatively impacting the country's region and economy. Averting these types of potential risks will lead to protecting the lives of the citizens and to the sustainable economic development of Indonesia.

Potential risk should not be actualized, but should be prevented. The higher the probability of averting risk, the higher the safety and reliability will be. These types of potential risks exist among numerous plants operated throughout Indonesia. Therefore, by increasing the recognition of preventive maintenance among policymakers and within the industry, risk aversion could be expected.

Therefore, if the market on inspection for preventive maintenance for industry infrastructure is expanded, employment opportunities would increase for people with the technical skills for inspection, and with more advanced trained staff in the inspection field, a greater cycle of safety and reliability of industry infrastructure could be expected.

#### 4) Direct Effects

Direct effects are shown below.

- Increased preventative maintenance inspection opportunities through use of SC
- Development of advanced inspectors in the infrastructure inspection market
- Dissemination of prevention/maintenance knowledge in the demand for infrastructure preparation
- Prevention of accidents that would cause large socioeconomic loss

#### 5) Indirect Effects

- Boost in economic growth led by the private sector oil industry
- Creation of employment opportunities in the inspection industry
- Decreased waste through long-term use of plants

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

- SUCOFINDO has continuously increased inspectors who can use SC through on-the-job training.
- As a leading inspection services company in Indonesia, SUCOFINDO has continuously promoted the importance of preventative maintenance to plant owners through the use of SC.

#### 4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business

Development of the Product/ Technology in the Surveyed Country

We confirmed that there are strong demands from oil refinery and oil chemical companies to check clogged pipes in the plant. These demands are not only limited to inspection engineers on-site but also from plant owners and plant operators. By commercializing the technology that meets these high demands, the following development effects can be expected. First, SUCOFINDO will increase advanced inspectors who can utilize SC within SUCOFINDO through their own on-the-job training and B to B collaboration between SUCOFINDO and Chugai-technos. Second, the merit for preventing clogging pipes will be recognized by plant owners in Indonesia through B to B collaboration between SUCOFINDO and Chugai-technos. Third, continuing the B to B collaboration will enhance recognition and awareness for preventative maintenance in plant operation by plant owners in Indonesia.

(2) Lessons Learned and Recommendation through the Survey

We express our utmost gratitude to SUCOFINDO for their cooperation in the execution of this project as a C/P.

We would like SUCOFINDO to make an effort to recognize the importance of preventative maintenance as a distinguished leading company towards plant owners in Indonesia. Also, we would like SUCOFINDO to propose the enactment of relevant policies regarding preventative maintenance in plants towards government institutions such as ESDM.

It is a great honor for us to work with SUCOFINDO on this project, and we learned

significant lessons in the process of this project. We hope to develop this business collaboration further as a BtoB partner.

## ATTACHMENT: OUTLINE OF THE SURVEY

