Workshop on PCBs Management

9th-10th February, 2017

PCB Waste Treatment in JAPAN

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Japan Environmental Storage & Safety Corporation (JESCO)

PCB Treatment Business Department

Outline of Presentation

- ✓ Outline, PCB Treatment Scheme of JESCO
- ✓ PCB Wastes, their Treatment Technologies and Treatment Framework
- ✓ Achievements and Schedule
- ✓ Safety Control of PCB Treatment Facilities

History of PCB Wastes

1954	Start of PCB manufacturing in Japan (Kanegafuchi Chemical Ind., Mitsubishi Monsanto Chemical Co.)
1968	Outbreak of Kanemi Oil Poisoning Case (Food poisoning due to PCBs)
1972	Ban of production and distribution of PCB through administrative guidance
1973	Electrical Insulator Treatment Association Foundation plans to build PCB treatment facilities

11000 missing PCB equipment reported in survey by the Ministry of Health (MOH) in 1998

- Attempts to establish incineration plants. Incineration unwelcome to residents because of exhaust gas problems.

During the three decades, all 39 attempts to establish PCB treatment facilities resulted in failure

2001	Adoption of "Stockholm Convention on Persistent Organic Pollutants (POPs)
	The Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes enacted (Original deadline for treatment was July 2016)

The Ministry of the Environment (MOE) assigns JEC (former JESCO) to establish PCB treatment facilities using chemical treatment technologies

2003	Establishment of Basic Plan for PCB waste treatment
2004	Establishment of JESCO (Japan Environmental Safety Corporation)

Newspaper Article
(MOH Survey reveals missing PCB equipments)

朝日新聞　2000年(平成12年)5月23日　火曜日

PCB含む変圧器と蓄電器

紛失・不明1万8000台

未処理20万台 6年間で倍増

厚生省全国調査

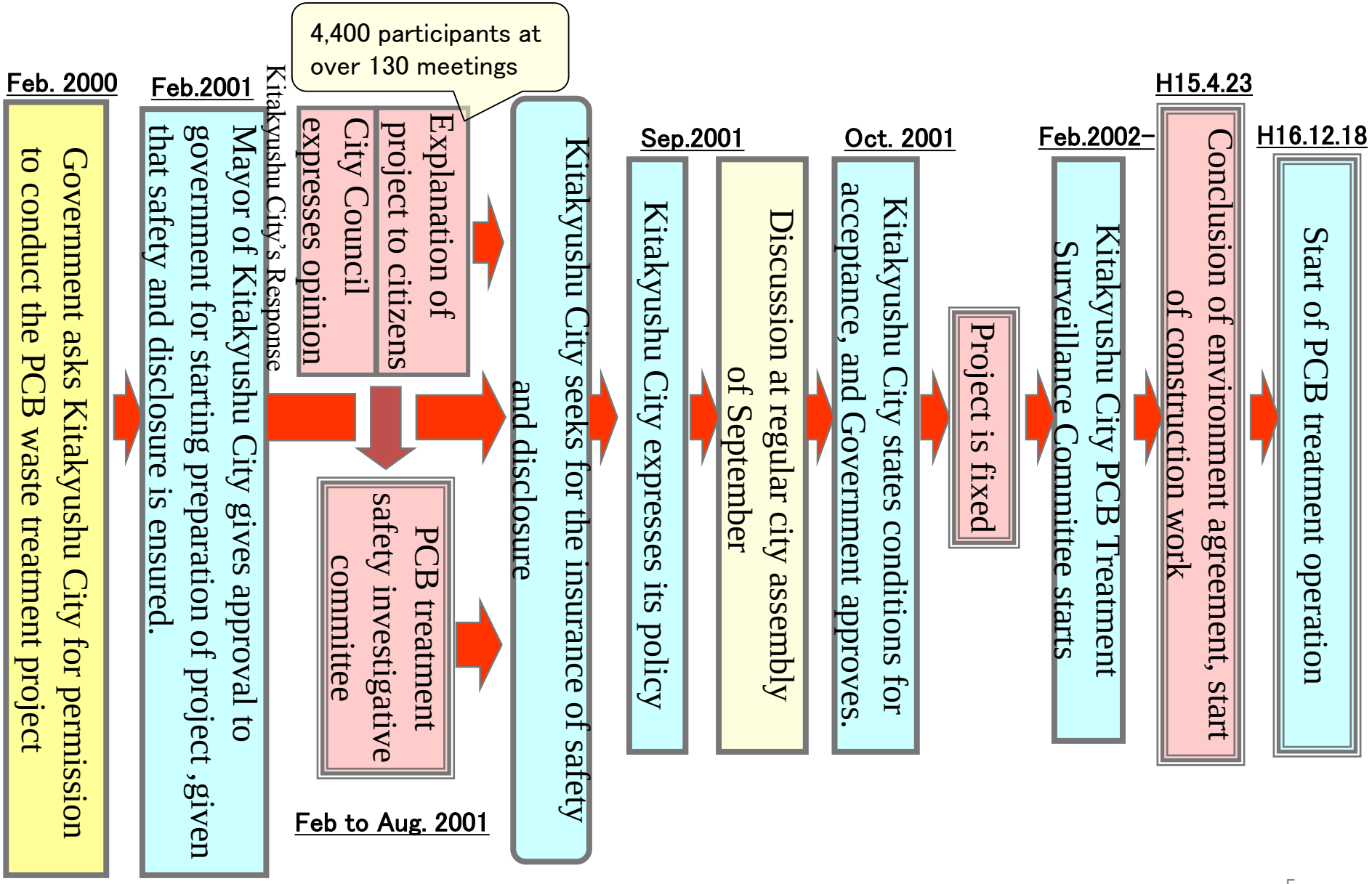
国は追跡調査急げ

未処理PCB 住民監視下で対策を

〈解　説〉

May 23, 2000 Asahi Newspaper

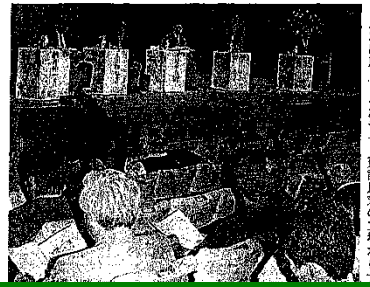
Process of PCB treatment project at Kitakyushu City



Road to PCB Treatment

Articles on arguments and movements concerning establishment of Kitakyushu Facility

PCB施設に賛否激論



市の住民意見交換会

反対 まずは

賛成 保管継

ドクロマークの帽子をかぶり、横断幕を先頭にパレード行進する参加者

「PCB施設、白紙撤回を」

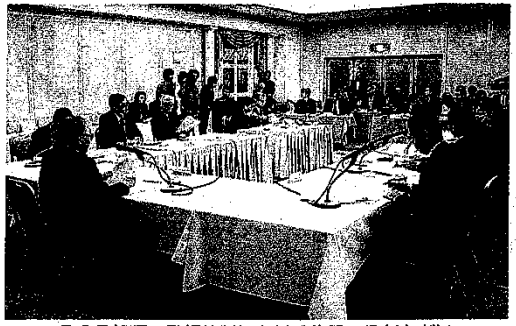
建設反対の市民団体 若松で署名活動やデモ

市長、受け入れ表明

北九州市にPCB処理施設

安全性確保 条件に

若松区の工場跡地



PCB処理の監視体制における住民の役割などについて意見が相次いだ第２回検討委員会

北九州市PCB安全性検討委

「住民を監視役に」

輸送の責任体制明確化を

国が若松区響灘地区に建設を計画している有害化学物質ポリ塩化ビフェニール（PCB）無害化処理施設の安全対策を議論する「北九州市PCB処理安全性検討委員会」の第二回会合が十三日、小倉北区のホテルであった。委員からは、住民参加によるPCB輸送・処理の監視体制づくりを求める意見が相次いだ。

この日は、「PCB処理における関係者の役割」と「情報公開および住民関与」をテーマに、小泉明委員長（日本医師会副会長）ら七人が約二時間意見を交わした。

「住民関与」については、施設建設に伴う事前の環境影響調査のサンプリング（標本抽出）に住民を参加させたり、操業中の施設内を常時公開したりして、住民に監視機能の一部を担ってもらう案が多数あった。

「関係者の役割」の議論では、PCB輸送に対する責任の所在について「輸送をJRや運送会社に委託するにしても、総体的な責任は国、県、市と環境事業団が負うべきだ」などの意見が出た。

また、輸送中の事故などの対応について、田辺信介委員（愛媛大教授）らから「どんな事態が予想されるのか具体的に考えるべきだ」「緊急対応のマニュアル（手引書）が必要」など市への注文が相次いだ。

同検討委は五月下旬、委員と市民の意見交換会を開催する予定。

出典：北九州事業所における講演資料

PCB Special Measures Law in 2001 at Time of Enactment

Enacted & enforced to ensure the sound treatment of PCB wastes

◆Disposal period (Article 10)

→ Defined as within 15 years of enactment, i.e. by July 2016, under the Cabinet Orders

◆Notification of Storage (Article 8)

→ All waste holders must report yearly on status of PCBs storage and disposal in each given prefecture/city of cabinet orders

◆Restriction of exchange (Article 11)

→ In principle, PCB wastes must not be passed on or received from one organization to another

PCB Waste Holders

- Responsible for treatment (Art.3)
- Report on storage & disposal (Art.8)
- Dispose before deadline (Art.10)
- Transfer of ownership (Art.16)

PCB Manufacturers

- Cooperate with national & local government measures (Art.4)

PCB wastes disposal fund

Contribution of funds

National Government

- Collect info; Develop technology & treatment system (Art.5)
- Develop basic treatment plan (Art.6)
- Promote development of treatment facilities (Art.21)

Treatment carried out by JESCO

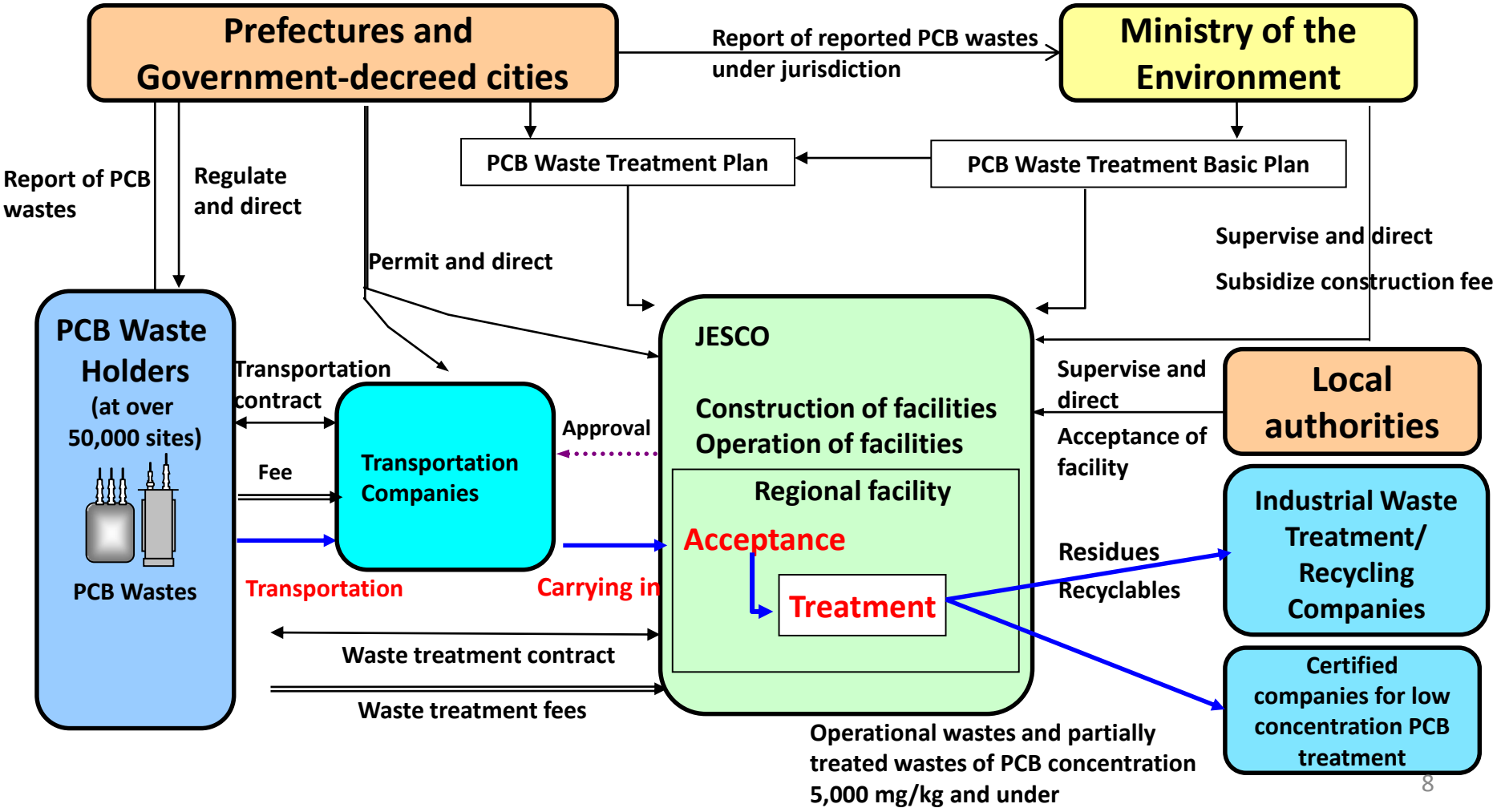
Investment & Assistance

Local Government

- Assessment of the situation of PCB waste (Art.5)
- Develop treatment plan (Art.7)
- Publish storage & disposal status (Art.9)
- Guide & advise waste holders (Art.14)

PCB Treatment Scheme

JESCO detoxifies PCB wastes, receiving treatment fees from holders of highly contaminated PCB wastes, under the direction and supervision of national/local governments.



Framework for PCB Treatment

①Transformers and Capacitors


Transformers


Capacitors

About 340,000 units

②Ballasts and other highly concentrated PCB wastes


Ballasts


Sludge

Ballasts	Other wastes
About 6,000,000 units	Carbonless paper: 700t Waste cloth: 200t Sludge: 20,000t

③Products contaminated by low-concentration PCB


Transformers, etc

About 1,600,000

OF Cables

1,400km

Pole-mounted Transformers

About 3,820,000 units

Treated at JESCO	Treated at JESCO	MOE Certified Treatment Facilities	Power Companies
・5 regional facilities ・Chemical treatment	・Kitakyushu Faciliity（2009-） Hokkaido Facility（2013-） ・Plasma Melting treatment	・Treatment starts in 2010 ・31 facilities certified as of Feb. 2, 2017	・Treated at their own facilities
・75～95% has already been treated（based on registration to JESCO）	・Kitakyushu Area and Hokkaido Area ・Low-concentration (5,000mg/kg and under) PCB wastes are treated at MOE Certified treatment facilities (See the right article)	・Although treatment capacity and amount of treated wastes have increased, it is needed to promote and accelerate treatment.	・Treatment is largely completed

PCB Standards in Japan and other Countries

Country	Limit Value
Japan	**0.5mg/kg (=ppm) < ※**
USA, Australia	50ppm ≦
Canada, EU	50ppm <
The Netherlands	0.5ppm < ; one of the 7 congeners

※ PCB concentration in waste electrical insulating oils

In Japan, any other wastes are categorized as “PCB waste” when PCB is detected from the waste.

PCB Treatment Standards and their Test Methods

Type of Waste	Test Method	Standard
Waste Oil (treated)	Content Test	≦0.5mg/kg
Waste Plastics, Scrap Metals, Waste Ceramics	Cleansing Solvent Test	≦0.5mg/kg
	Wiping Test	≦0.1μg/100cm^2
	Material Collecting Test	≦0.01mg/kg
Waste Paper, Wood waste, Waste Fibers	Dissolution Test	≦0.003mg/ℓ
Waste Acid Waste Alkaline	Content Test	≦0.03mg/ℓ
Others	Dissolution Test	≦0.003mg/ℓ

Outline of JESCO

JESCO is a special company wholly owned by the government based on relevant laws, conducting PCB waste treatment, and implementing interim storage activities on consignment from the government and others.

Governing Law: Japan Environmental Storage & Safety Corporation Law

The Law defines the business scope of JESCO, as (1) the PCB waste treatment business and (2) the interim storage of radiation-contaminated soils and others in Fukushima (since December 24, 2014).

Regulatory Agency: Ministry of the Environment

Establishment: April 1, 2004

Capital: 600 Million Yen (100% government-funded)

Members and Employees: 9 members and 303 employees (as of December 2014)

Treatment Methods at JESCO

- **JESCO adopts chemical treatment technology（Dechlorination Method）for treating PCBs in transformers and capacitors. Chemical reaction turns PCB into byphenlys and salt, which are harmless substances.**
- **For the treatment of PCB contaminated wastes, JESCO adopts plasma melting method, which turns PCBs into carbon dioxide and hydrogen chloride**
- **Operations are conducted in a closed system, including negative pressure control.**

Dechlorination

○ Dechlorination method uses a chemical reaction that uses alkali(sodium), which replaces chlorines with hydrogens, turning PCB into byphenlys and salt, which are harmless substances.

Plasma Melting

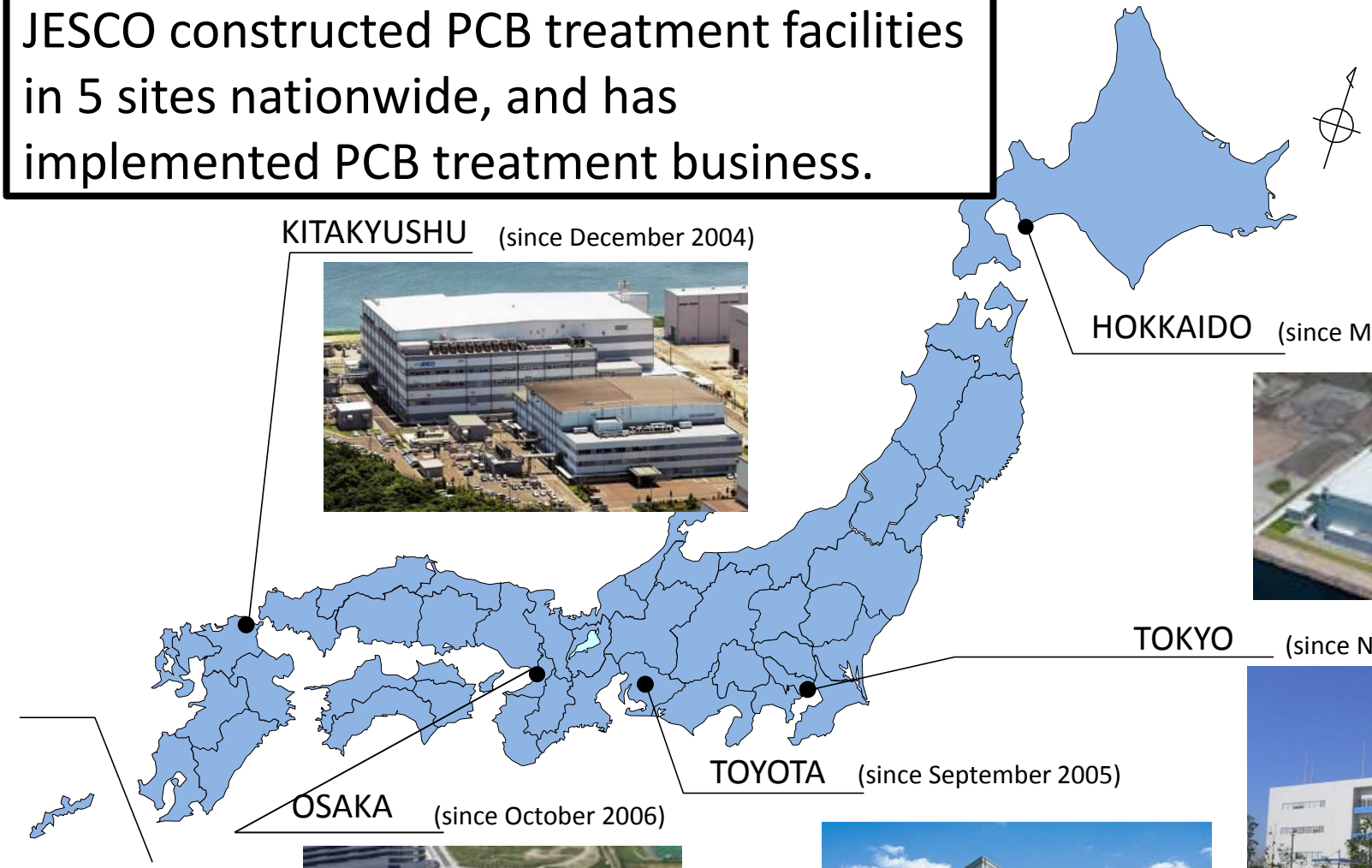
○ In the Plasma Melting method, irradiation of plasma arc (15000℃ and over) melts down and decomposes the drums or pails together with the PCB wastes included. PCBs are turned into carbon dioxide and hydrogen chloride.

Operations in Closed system

○ Tor prevent the leaking of PCB outside the facility, operations are conducted in a closed system. Air pressure of PCB handling areas are kept negative.

PCB Treatment Facilities

JESCO constructed PCB treatment facilities in 5 sites nationwide, and has implemented PCB treatment business.



Kitakyushu PCB Treatment Facility

＜ Outline of facility ＞

- Location: 1-62-24 Hibikimachi, Wakamatsu-ku, Kitakyushu City, Fukuoka 808-0021 JAPAN
- Lot area: Approx. 54,000 square meters
- Treatment Capacity：1.5tons/day (PCB decomposition volume) ,10.4tons/day (PCB contaminants volume)
- Treatment Method: Dechlorination decomposition method(PCB treatment)
  Plasma Melting decomposition method（PCB contaminants treatment）

- Integrated engineering company:（1st phase） Nippon Steel Corporation
  （2nd phase） Nippon Steel Engineering Co. Ltd.

Toyota PCB Treatment Facility

＜ **Outline of facility** ＞

- Location: 3-1-1 Hosaya-cho, Toyota City, Aichi 471-0853
- Lot area: 9,773.73 square meters
- Treatment Capacity : 1.6tons/day (PCB decomposition volume)
- Treatment Method : Dechlorination Method
- Integrated engineering company : Kubota Corporation

Tokyo PCB Treatment Facility

＜ **Outline of facility** ＞

- Location: 3-chome Aomi Chisaki Koutou-ku, Tokyo, 135-0064 JAPAN
- Lot area: Approx. 30,500 square meters
- Treatment Capacity : 2.0tons/day (PCB decomposition volume)
- Treatment Method : Hydrothermal Oxidation Method
- Integrated engineering company : Mitsubishi Heavy Metals Industries, Ltd.

Osaka PCB Treatment Facility

＜ Outline of facility ＞

○Location:(West wing)2-4-13 Hokkou-Shiratsu Konohana-ku, Osaka 554-0041
(East Wing)2-3-35 Hokkou-Shiratsu Konohana-ku, Osaka 554-0041

○ Lot area: Approx. 29,000 square meters

○ Treatment Capacity：2.0tons/day (PCB decomposition volume)

○ Treatment Method: Dechlorination Method

○ Integrated engineering company：Mitsui Engineering & Shipbuilding Co., Ltd.

Hokkaido PCB Treatment Facility

＜Outline of facility＞

○Location: 14-7 Nakamachi, Muroran City, Hokkaido 050-0087

○ Lot area: Approx. 40,000 square meters（Original facility）、Approx. square meters（Additional facility）

○ Treatment Capacity：1.8tons/day (PCB decomposition volume), 12.2 tons/day (PCB contaminants volume)

○ Treatment Method: Dechlorination decomposition method(PCB treatment)
Plasma Melting decomposition method（PCB contaminants treatment）

○ Integrated engineering company:（Original facility）Nippon Steel Corporation
（Additional facility）Nippon Steel Engineering Co. Ltd.

Costs for PCB Treatment

【Basic Idea】

•PCB waste projects conducted by JESCO do not seek profits. Balance sheets are to break even.

•Thus, total costs (construction costs, operation costs, home office costs for shutdown and dismantling facilities) are to be equal to treatment fee incomes.

•Treatment fees are same throughout the nation, and do not vary from region to region.

Total Treatment Costs at JESCO（as FY 2014）		Total Income	
	440,000 mil. JPY		440,000 mil. JPY
（Breakdown）		（Breakdown）	
Construction Costs （Kitakyushu 1st phase）	16,500 mil. JPY	Treatment fees from PCB owners	320,000 mil. JPY
（Kitakyushu 2nd phase）	13,400 mil. JPY	Governmental subsidy	120,000 mil. JPY
（Toyota）	22,500 mil. JPY		
（Tokyo）	28,600 mil. JPY		
（Osaka）	27,900 mil. JPY		
（Hokkaido Original）	26,600 mil. JPY		
（Hokkaido Additional）	27,800 mil. JPY		
Operation Costs	276,700 mil. JPY		

Example of Treatment Fees at JESCO (Highly concentrated PCB wastes)

[Examples]

Below are examples of treatment fees for highly concentrated PCB wastes at JESCO.

①Transformers (and similar equipment)

Treatment fee for one transformer weighing 4,000kgs: 14,749,000 JPY

②Capacitors (and similar equipment)

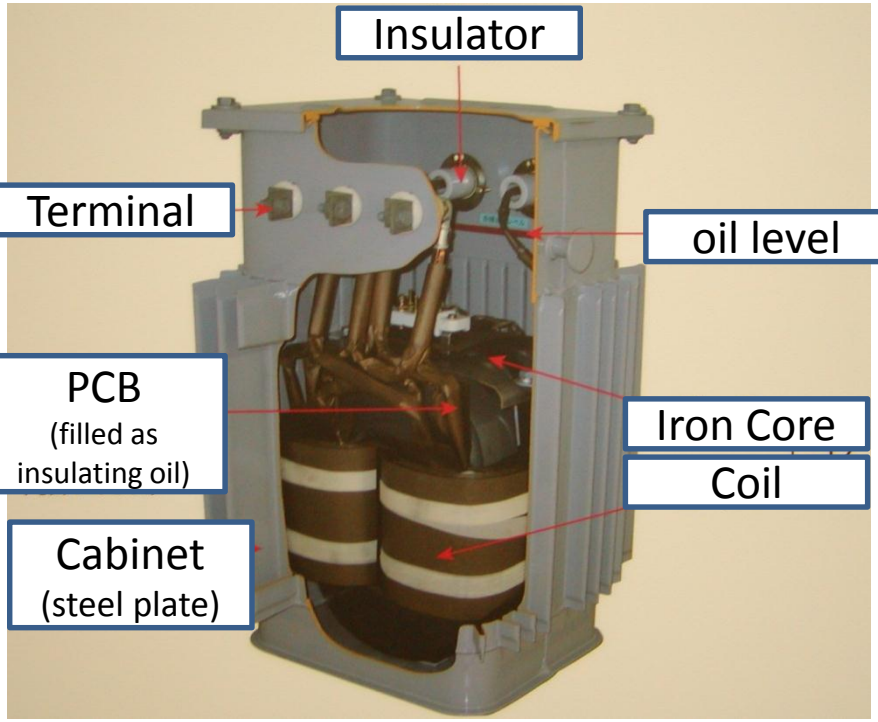
Treatment fee for one capacitor weighing 100kgs: 1,114,000 JPY

③Ballasts and others

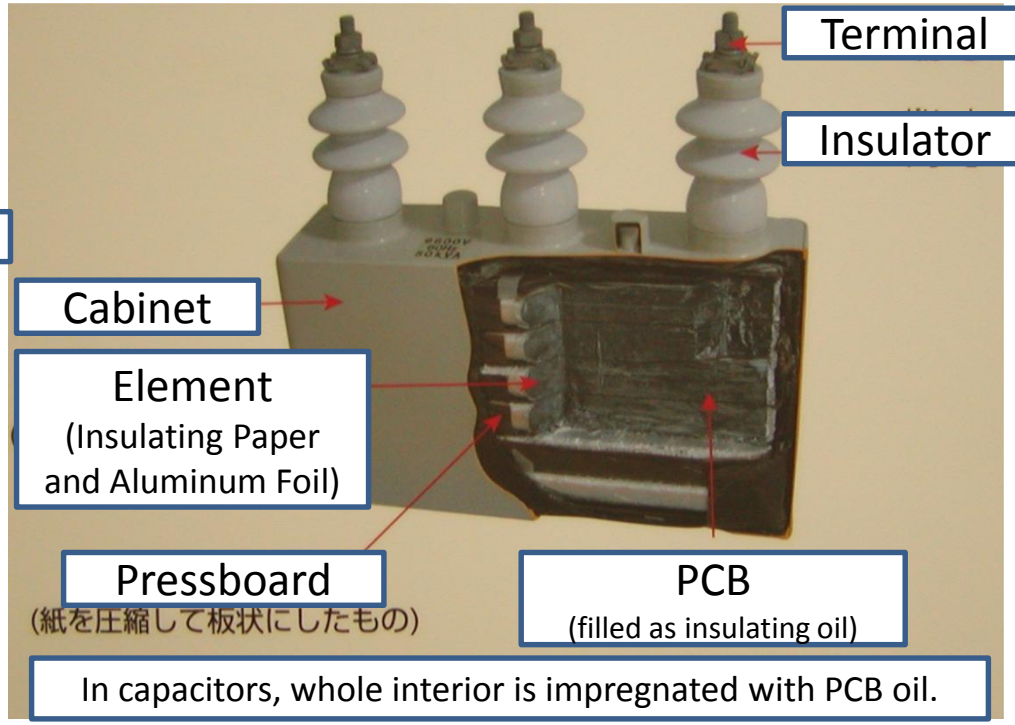
30,240 JPY /kg

High-Voltage Transformers and Capacitors

Electric devices that use PCB as insulating oil, with PCB concentrations from 60 to 100%.
As of the end of March 2012, approx. 30,000 HV transformers and approx. 200,000 HV capacitors were stored by Waste Holders.



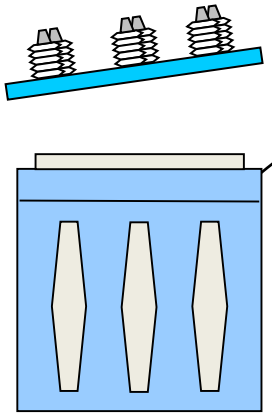
HV transformers



HV capacitors

Treatment Technologies of High-Voltage Transformers and Capacitors

JESCO extracts PCB oils inside the high-voltage transformers and capacitors, cleanses residual PCB oils, and then chemically decomposes these PCB oils. Metal cabinets etc. after cleansing are directed to material recycle etc., after confirming the PCB levels are satisfactorily low.



After extracting PCB through a hole on the cabinet, cleanse the interiors and remove PCB from the lid

PCB oil **(Waste PCB)**

Cabinets of transformers

Transformers

Their inside is filled with PCB as insulating oils

Main unit
- Metal cabinets **(PCB-contaminated wastes)**
- Iron Core
- Ceramics
- Coil
  - Copper wire
  - Paper
  - Wood

Decomposition

Decomposed materials (waste oil, water etc.)

Cleanse and separation

Metal cabinets etc. after PCB removal

Secondary Wastes (Activated carbon, protective gears)

Pretreatment Processes

Decomposition Process

Treatment Technologies of High-Voltage Transformers and Capacitors

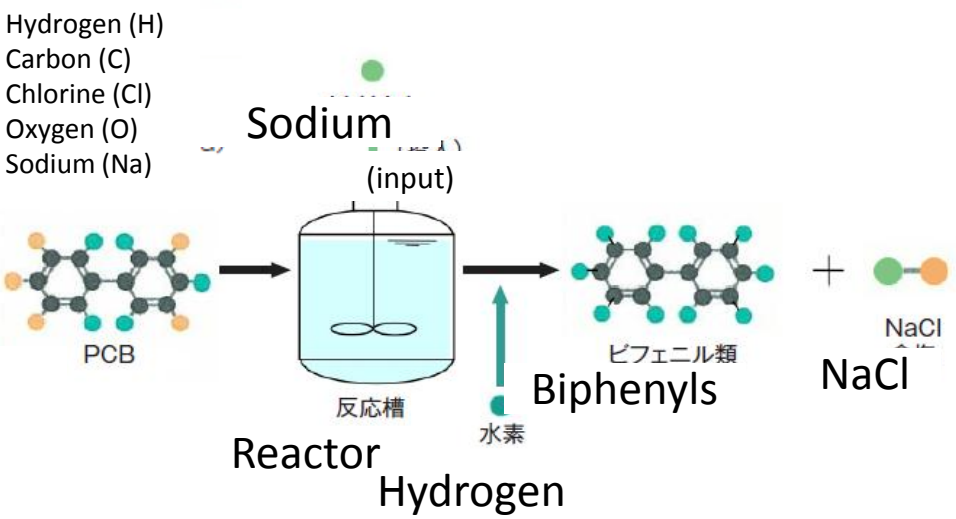
JESCO adopts chemical treatment methods to detoxify PCB oils, out of the treatment technologies approved by the Ministry of the Environment. Therefore, the only outputs after the treatment are harmless substances.

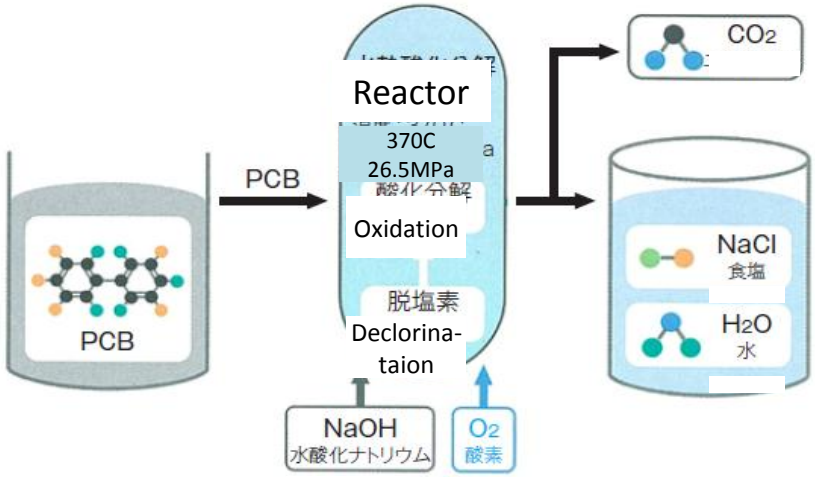
Dechlorination method (4 facilities excluding Tokyo)

Chlorines of PCB are substituted by hydrogen and hydroxyl, and decomposed into biphenyls.

Hydrothermal Oxidation Decomposition method (Tokyo facility)

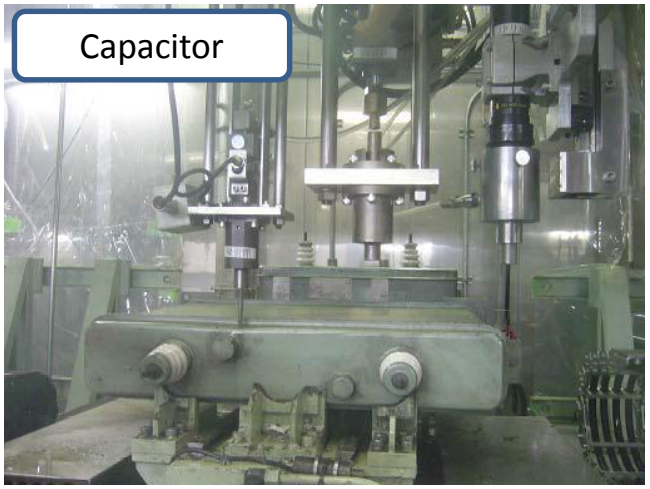
PCB is decomposed by oxidation reaction in sub-critical water with high temp. and high pressure. Carbon and hydrogen atoms of PCB are oxidized into CO2 and H2O, and chlorines are discharged as NaCl.



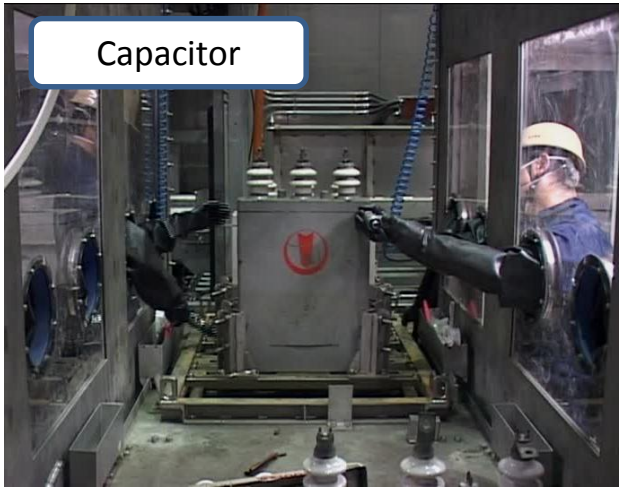


Treatment Technologies of High-Voltage Transformers and Capacitors

Extracting and Cleansing PCB oils in transformers and capacitors



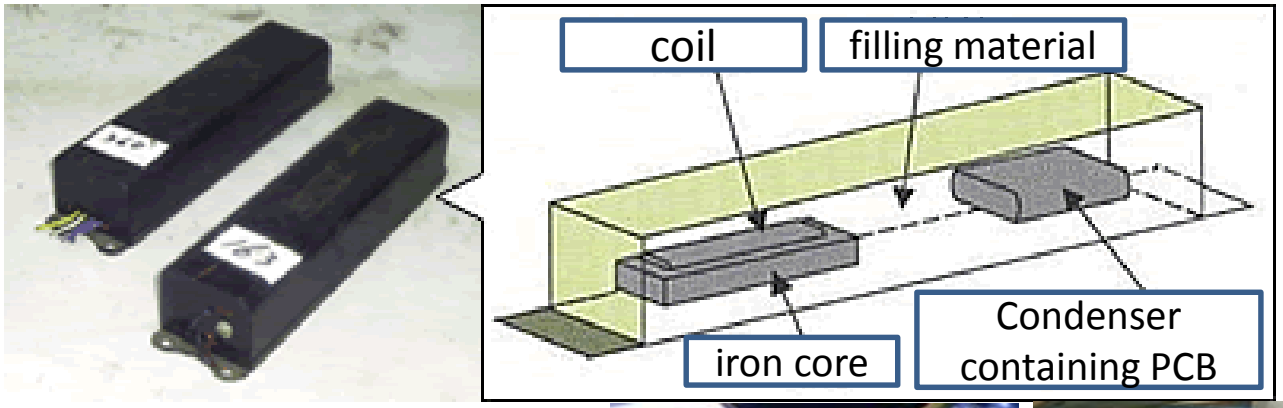
Disassembling transformers and capacitors



Ballasts and other PCB-contaminated Waste

Ballasts etc.: Small condensers containing PCB as ballasts to stable voltage of lamps, and other small waste electric devices. As of the end of March 2012, approx. 6 million units were stored by Waste Holders.

PCB-contaminated waste: thermal paper, waste rags used to swab liquids, sludge, and other contaminated wastes such as iron, plastic, wood and paper.



Ballasts

Carbonless paper

Waste rags

Sludge

Treatment Technology of Ballasts and other PCB-contaminated Waste

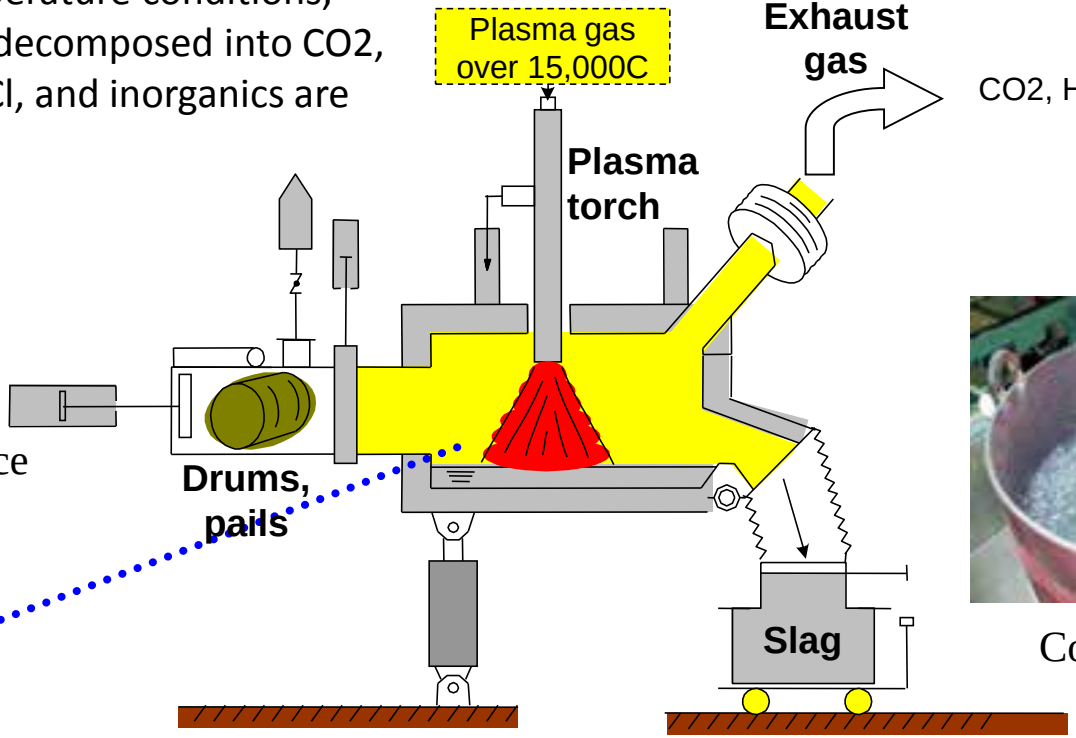
JESCO decomposes ballasts and other PCB-contaminated wastes by plasma melting decomposition units, after repacking in drums and pails.

Plasma Melting Decomposition method
(Kitakyushu and Hokkaido)

Through the melting decomposition under extremely high temperature conditions, organic matters are decomposed into CO2, water vapors and HCl, and inorganics are discharged as slag.

Plasma melting furnace

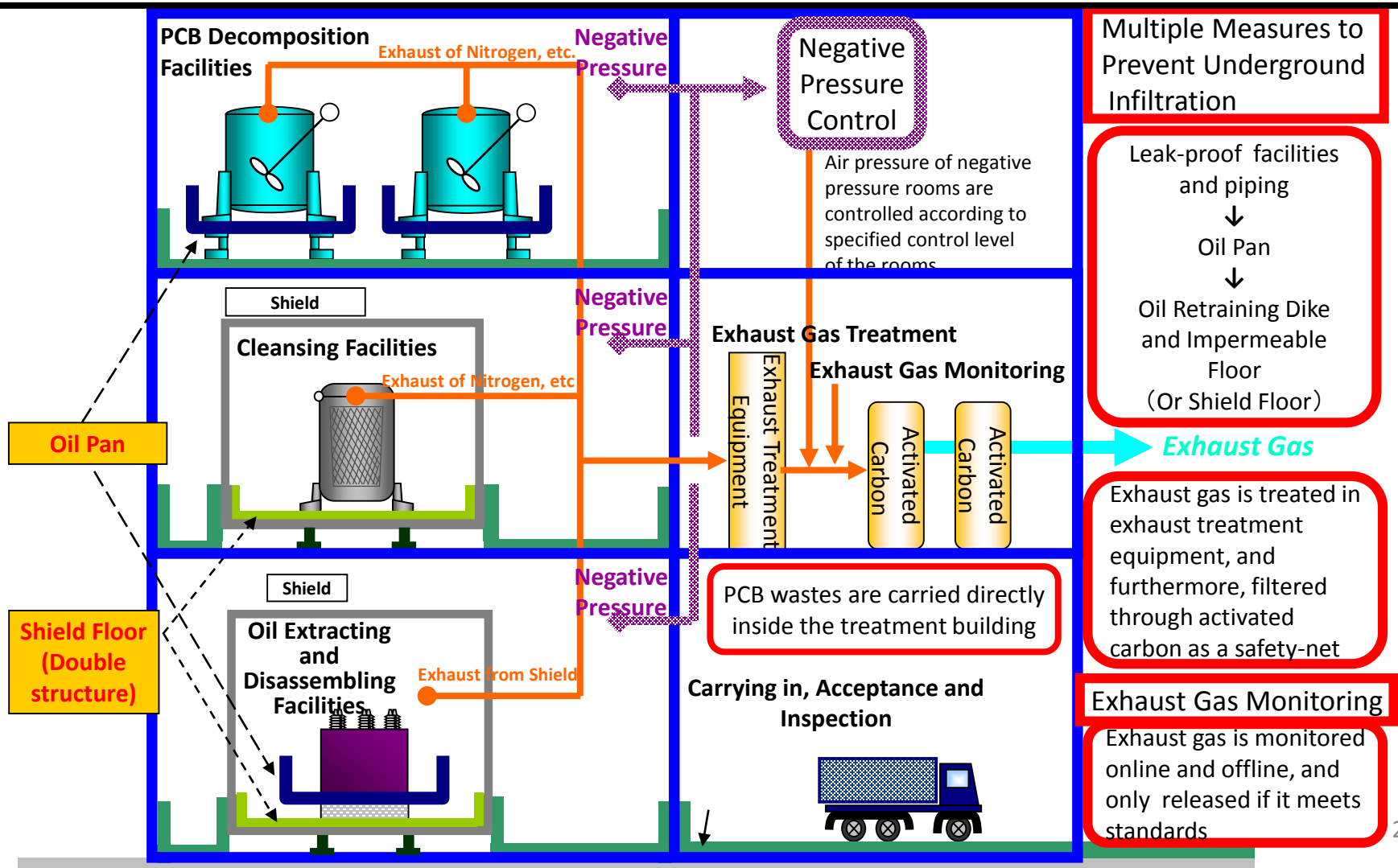
Melting state inside furnace



Cooled slag

Safety Control of Treatment Facility

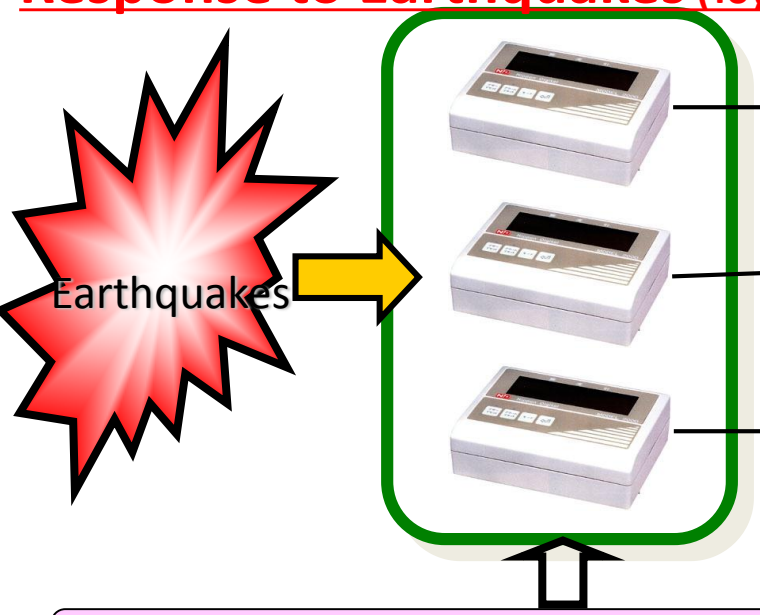
JESCO ensures the safety of treatment facilities with multi-staged preventive measures, so that PCB will not leak outside the facilities.



Safety Control of Treatment Facility

JESCO's treatment facilities are designed providing for the emergent events such as earthquakes and fires. In addition, in preparation for the emergencies, each facility developed the manual to organize disaster response teams and establish emergency contact channels, and has implemented disaster-preparedness drills every year.

Response to Earthquakes (Toyota's case)



Over acceleration 80gal

Pre-set intensity level

Below acceleration 80gal

Emergent Shut-down
With the quakes over pre-set intensity level detected, devices are to shut down automatically and safely, and automatic valves operate to safe sides.

Inspection and Suspension
Even for the quakes below pre-set intensity level, JESCO will promptly inspect and/or suspend devices and evacuate in accordance with the emergency manual.

Seismoscope: three devices are deployed from the fail-safe viewpoints

Earthquake-proof design

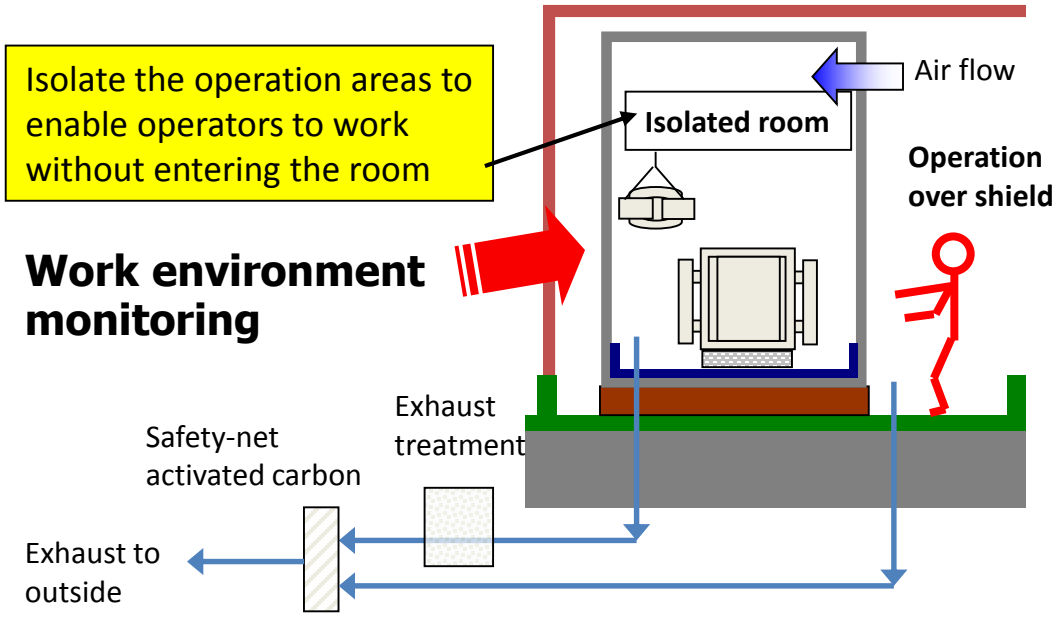
Facilities have quake-resistance capacity even beyond the levels required by relevant regulations.

PCB Exposure Management of Operators

JESCO manages the working environment and operations in order to prevent exposure of operators to high-level PCBs.

- Compart and isolate areas with high PCB level working environment, and control those areas under negative pressure.
- Maintain cooler room temperature (to reduce evaporation and prevent heat stroke)
- Regularly measure the levels of PCB and dioxins in the working environment.
- Operations via glove box with shield etc., to prevention exposure.

(negative pressure control: air does not flow to areas with lower PCB level)



PCB Exposure Management of Operators

For operations in areas to handle high-level PCBs, JESCO minimizes the exposure to PCB by means of protective gears and restriction of entrance time.

- Operators are required to wear appropriate protective gear when working at working environment with dioxin levels over 2.5pg-TEQ/m^3, or with PCB levels over 0.01mg/m^3 (LEVEL 3 ZONES). Below is an example.
  - Chemical protective clothing
  - Chemical protective gloves + inner gloves
  - Chemical protective boots
  - Respiratory Protective Equipment with electric fan

- Appropriate protective gear is required according to the operation, at lower level zones too.

- Entrance time is limited to reduce exposure

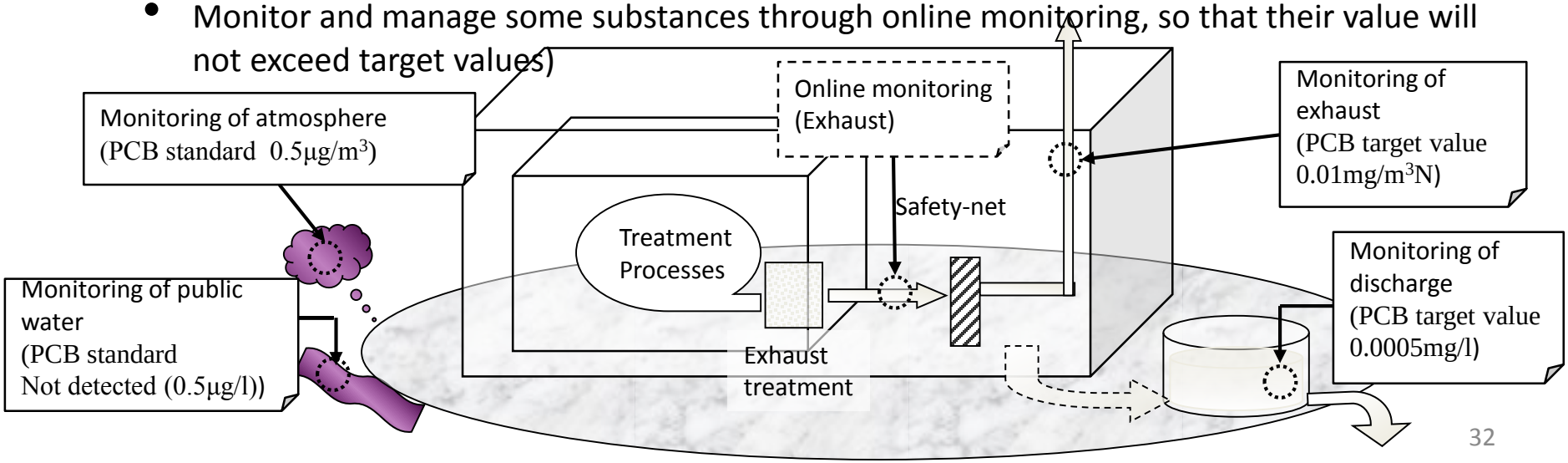
- Blood PCB levels are checked periodically.


(Example of Protective Gear at Kitakyushu Facility)

Environmental Conservation Agreements with Local Authorities

JESCO concludes an agreement etc. with the local governments where the facilities are located.
Under the agreement, JESCO is required to implement monitoring of the exhaust and discharge from each facility, and regularly monitor and disclose the concentrations of PCB and other toxic substances.

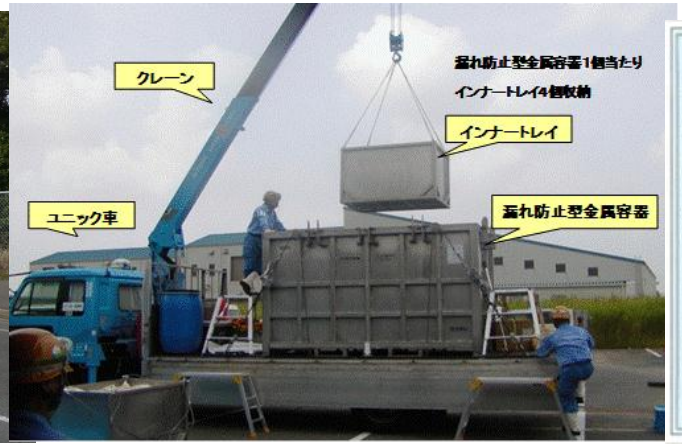
- Conduct monitoring of emission sources and surrounding environment to ensure the compliance with control target values
  - Sources (PCB and dioxins in exhaust, discharge and rainwater. Noise, vibration and odors)
  - Environment (PCB and dioxins in atmosphere, public water and soils)
  - Monitor and manage some substances through online monitoring, so that their value will not exceed target values)



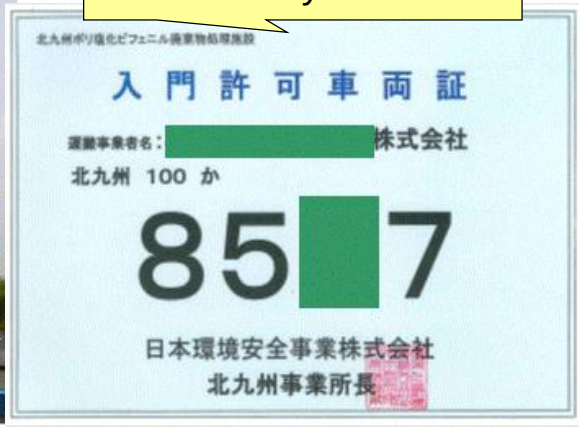
(concept of monitoring)

Safety Measures for Transportation

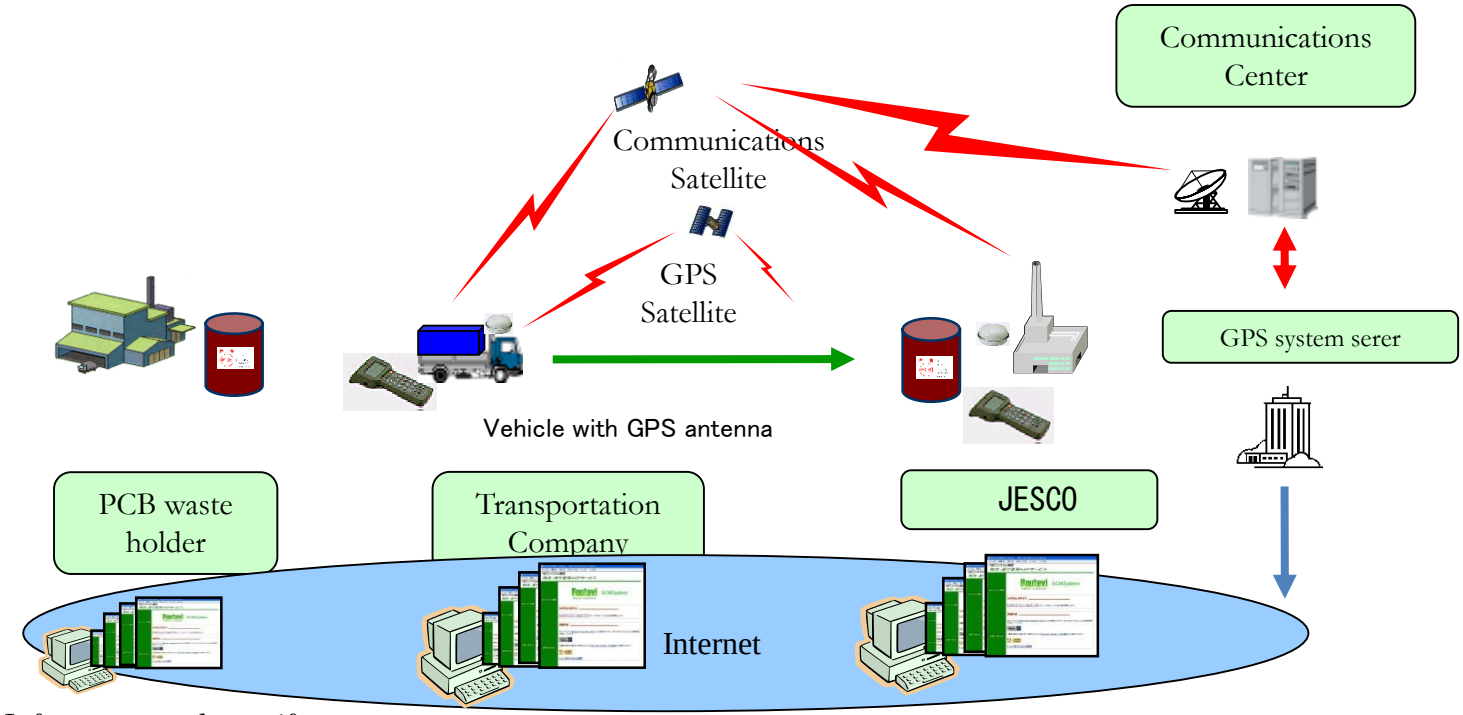
- JESCO limits transportation companies who can carry PCB waste to JESCO facilities (In addition to obtaining a license from local governments, transportation companies need to receive a certificate from JESCO)
- Stainless steel containers with leak-proof properties are required to carry wastes in.
- Real-time tracking by GPS System
- Transportation routes limited to major roads



Certificate by JESCO

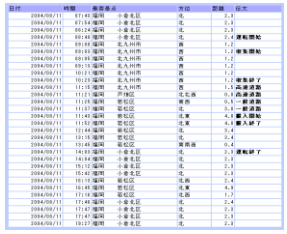


Transportation monitored by GPS System



Info. on control manifest for industrial waste

Status of tranporation



Travelling route

Daily Report (for transportation companies)

Outline of GPS System

Advisory Panels and Communication with Stakeholders

JESCO invites academic experts with abundant knowledge and experience in the PCB field and receive advices in promoting its business.
In addition, the local authority where JESCO's facility is located established a conference to keep JESCO's business under surveillance. JESCO makes efforts to improve its transparency through reporting the status of activities, including accidents at treatment facility.

- PCB Treatment Business Committee
  - JESCO receives comprehensive considerations, directions and evaluation to the overall business.
  - Business Sub-Coms and Technology Sub-Com: Advise the treatment technologies at each facility and new technologies.
  - Operational Safety Sub-Com: Advise the operational safety issues.

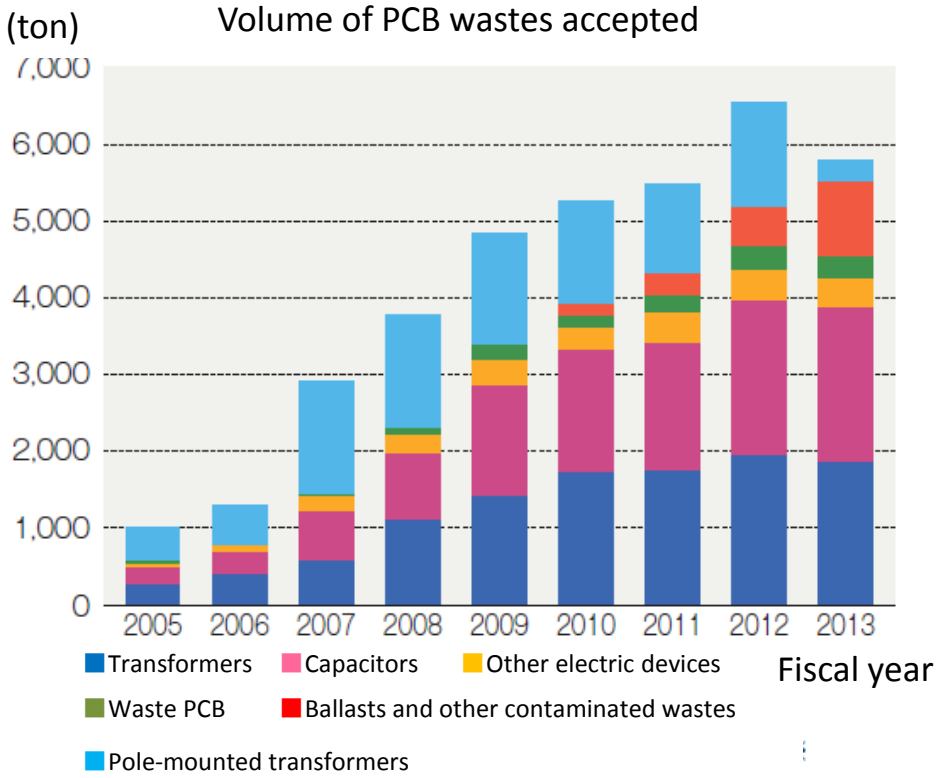
- Surveillance Committee
  - JESCO explains the progress and safety control of each facility at the surveillance committees established by local authorities etc.

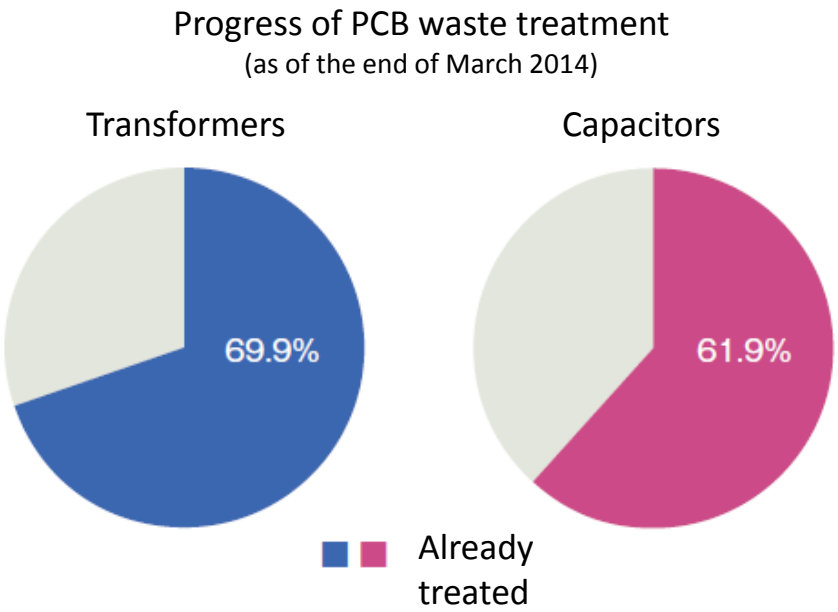
- Information Disclosure
  - Disclosure at facility's public space (access to monitoring results, acceptance of visitors)
  - Website (treatment progress and monitoring results at facilities, Environmental report)

Treatment Achievements So Far

Since its start of business, JESCO has accepted approx. 37,000 tons of PCB wastes in total, and detoxified 8,138 tons of PCB by March 2014.

Treated wastes account for 69.9% of transformers and 61.9% of capacitors compared to the total volume registered for treatment (as of the end of March 2014).





Beyond Accidents in the Past

At the early stage of its operation, there were 3 accidents in which PCB exhaust and discharge was leaked outside facilities, caused by initial failure of devices, inadequate safety management scheme.
JESCO investigated the causes of these accidents, and took preventive measures; since then, no leakage of PCB has took place. JESCO reports even minor accidents at the surveillance committees and promote the improvements in equipment, processes and management scheme; now JESCO continues stable and safe operations.

PCB leakage accidents in the past

- **Leakage of PCB exhaust at Toyota (21, November 2005)**
  - Because of dropout of pressure gauge of distillation tower's pump, PCB cleansing oils leaked inside the facility. Part of evaporated PCB vapor was leaked outside.
  - JESCO stop operations, investigated the causes, took measures to prevent the reoccurrence and thorough inspection of the overall facility, confirmed the safety during the trial operations, and then restart its operation. (operations halted for 8 months)
- **Leakage of PCB wastewater at Tokyo (28, March 2006)**
- **Leakage of PCB exhaust at Tokyo (25-26, May 2006)**

※ PCB was not detected in atmosphere and seawater near the facilities.

PCB Waste Treatment Promotion Measures, and Change of National Basic Plan

October 2011	New exploratory committee is established to examine progress of PCB treatment, given that 10 years had passed since the enforcement of the PCB special measures law
August 2012	Exploratory Committee Report is finished and released.
December 12, 2012	New deadlines (Original: July 2016→New: March 2027) for treatment of PCBs, set by revise in government ordinance.
October-November 2013	MOE requests local governments at the locations of JESCO's facilities to consider amendments in National Basic Plan for PCB waste treatment
June 6, 2014	Ministerial notification to change National Basic Plan for PCB waste treatment
June 17, 2014	JESCO amends its "PCB Waste Treatment Project Basic Plan", approved by the State Minister for the Environment .

Challenges in PCB Waste Treatment Processes

To ensure workers' safety (the level of PCB volatilization higher than expected), JESCO couldn't speed up PCB treatment enough to finish treatment by the original deadline (2016).

■Problems in Basic Processes

◆ Decomposition of PCB oil (PCB oil, washing solvents)

- No major problems in this area at all facilities.

◆ Treatment of Container and Material inside transformers and capacitors

- Due to multiple problems which turned out after start of operations, operation rates were low.
- It turned out that the level of PCB volatilization at room temperature were higher than first assumed when facilities were first planned. Working atmosphere became unhealthy, leading to a decrease in speed of PCB treatment because workers could not stay in the area for a long time.

Outline of the National Basic Plan for PCB Treatment

Change of Framework of PCB Waste Treatment

- Although highest priority is given to safety , the completion of PCB treatment should be done with no further delay.
- To take advantage of the strengths of JESCO's facilities, restrictions of the assigned areas are partially eased, and some wastes will be treated at facilities more suitable for the task.
- For the treatment of ballasts and other PCB contaminated wastes, existing plasma melting facilities at Kitakyushu Facility and Hokkaido Facility are assigned to treat all high concentration PCB contaminated wastes throughout the nation.

Main Actions

① For the safe and consistent treatment at JESCO

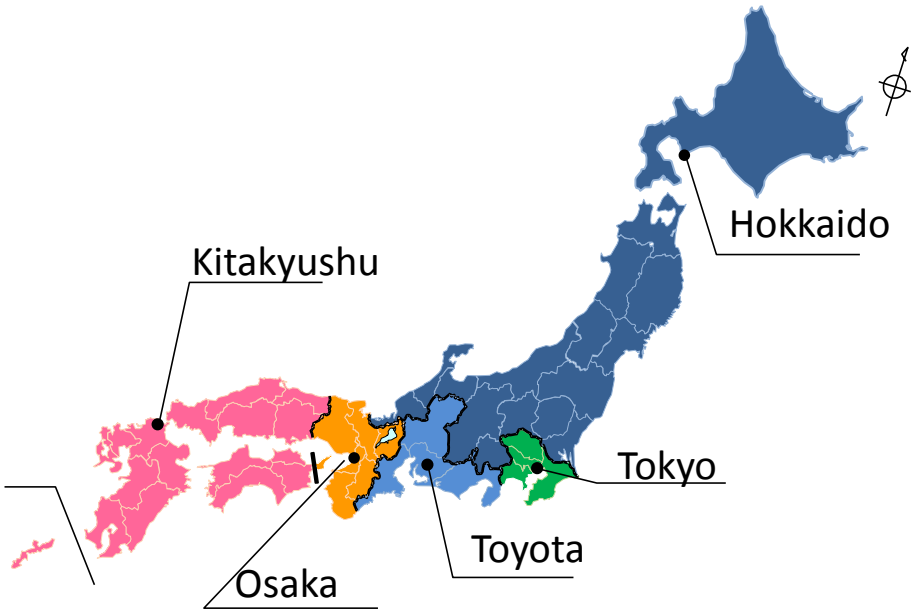
- Considering deterioration due to aging, facilities are to be repaired and updated under long-term equipment maintenance plan, and daily improvements in routine processes are encouraged.

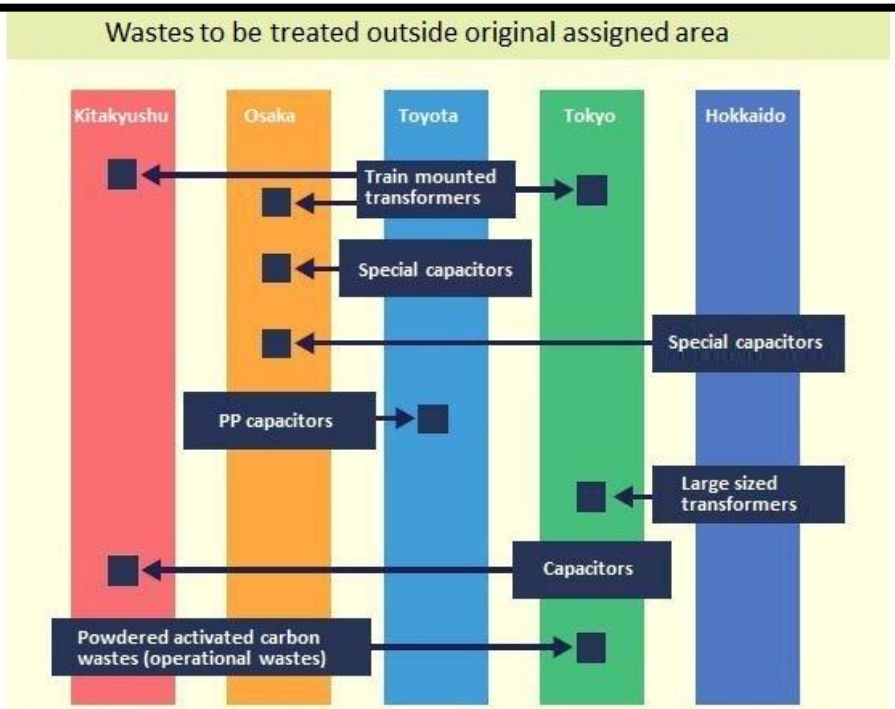
② To promote treatment by PCB owners

- Prefectures, central government, JESCO and electric maintanance companies are to cooperate to help prepare lists of untreated PCBs, and promote owners to treat PCBs.
- Measures to help PCB owners incapable to bear treatment fees. Measures to promote unwilling PCB owners to treat their PCBs.

Treatment Framework for High-Voltage Transformers and Capacitors

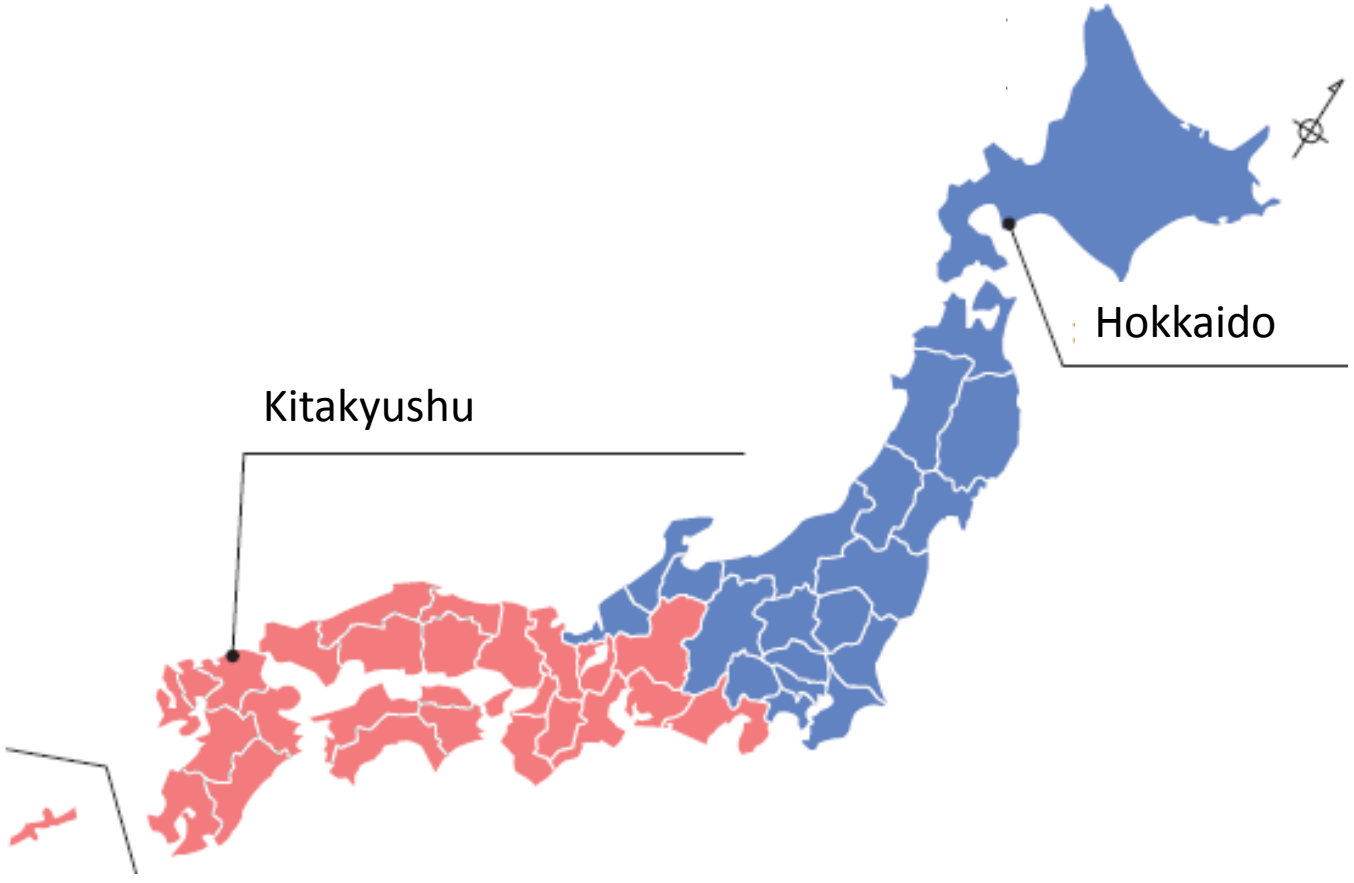
Each of the 5 PCB Treatment Facilities is assigned to treat HV transformers and capacitors in designated regions. In accordance with the national basic plan amended in June 2014, each facility has been allowed to treat PCB wastes beyond the original assigned area to take individual advantages, so that the PCB wastes in Japan are wiped out as soon as possible.





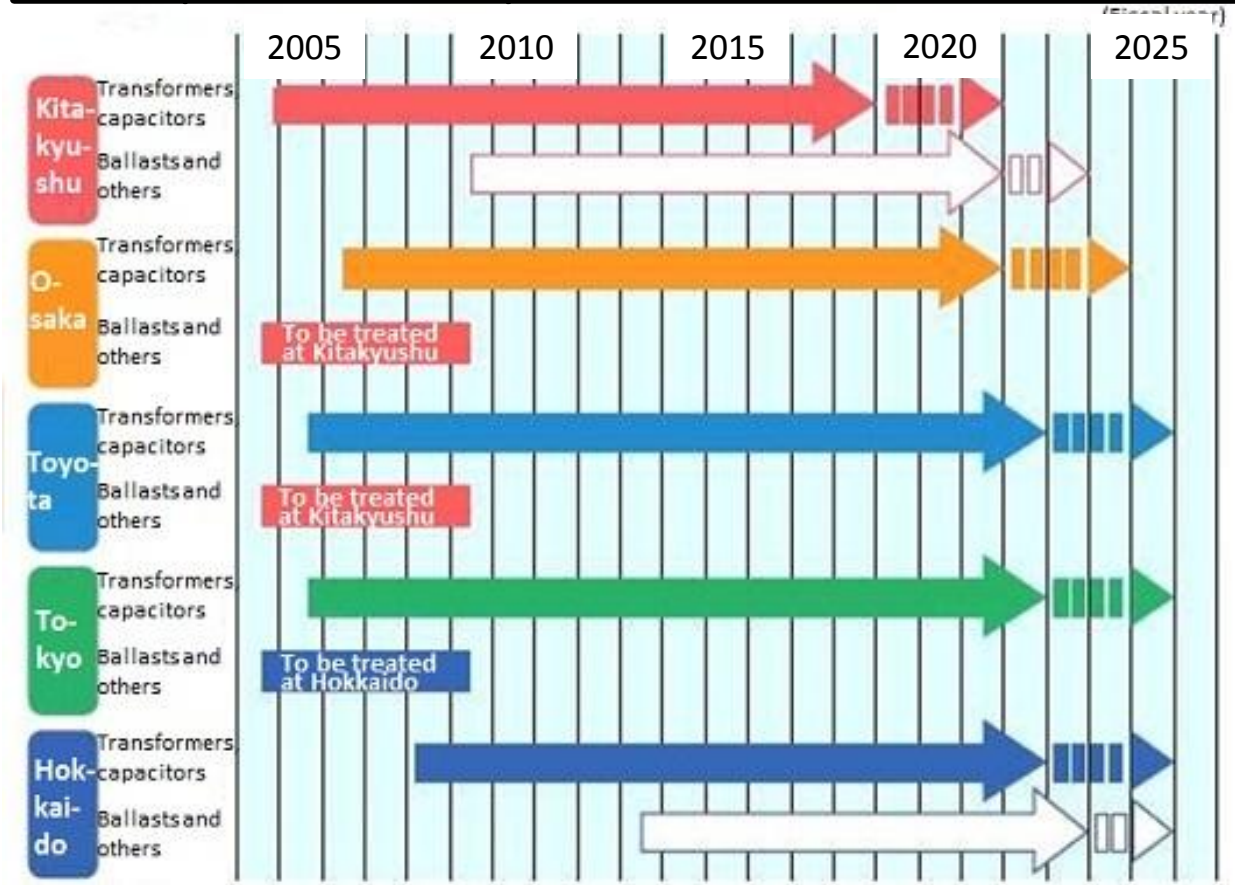
Treatment Framework for Ballasts and other PCB-contaminated Waste

In accordance with the national basic plan amended in June 2014, JESCO will treat ballasts and other PCB-contaminated wastes at Kitakyushu and Hokkaido facilities, except for part of small electric devices.



Treatment Deadlines

The amended national basic plan established (1) deadlines for Waste Holders to commission JESCO to treat their PCB wastes, and (2) periods to prepare for the completion of business. With this amendment, the treatment deadlines were deferred from the original ones (March 2015).



End of solid arrow:
Deadlines for Completion of Scheduled Treatment
(deadline for PCB waste holders to commission JESCO to treat PCB wastes)

Dashed arrow:
Preparation Periods for End of Business
(extra period for treatment of newly found wastes and difficult-to-treat wastes and for preparation of the ending operations and closing down facilities)

Explanation of New Framework to Citizens Near Facilities

Kitakyushu City

Nov 22, 2013　MOE holds meetings to explain new PCB framework

Jan 22, 2014　Public symposium held

Kitakyushu City holds 74 meetings, in which a total of 1,874 citizens participated.

Muroran City (Hokkaido)

Nov 2013, Mar 2014　Meetings held to explain to local residents.

（Concerns About Safety of Treatment）

- Top priority to be given to safety in operations.
- Fear of deterioration of facilities caused by extended years of operation.

（Concerns About Scheduled Treatment）

- Doubt on completion of PCB treatment within new deadline. Fear of further extension of deadline, if PCB treatment is not completed.
- Fear that volume of PCB wastes to be treated may increase.
- Further extension of treatment period unacceptable.

News Coverage on Explanation of New Framework to Residents

日本新聞　2013年(平成25年)11月23日　土曜日　北

PCB追加処理
若松区で説明会

環境省「再延長」
市民からは反

北九州市にポリ塩化ビフェニール（PCB）無害化の追加処理を求めている環境省は22日、若松区の若松市民会館で初の市民説明会を開いた。市民150人に対し「再延長はない」と受け入れに理解を求めたが、健康被害を不安視する市民からは「これまで6年間我慢してきたのに」「なぜ北九州にばかり負担を求めるのか」と国の姿勢を疑問視する声が相次いだ。

説明会では同省の塚本直也産業廃棄物課長らが登

全国の5施設で計画よりも処理が遅れていることについて、塚本課長は「最善を尽くしたが申し訳ない」と頭を下げる一方、施設の安全対策には自信をのぞかせた。さらに「（追加処理をしても）北九州では、今回示した2024年3月末で処理を終える。再延長はしない」と明言した。

質疑では、処理施設に近い地域に住む女性（75）が「当初は10年たては更地で戻す条件だった」と批判。

環境省が主催した市民説明会で、質問する参加者

PCB廃棄物の処理を巡って意見が交わされたシンポジウム

PCB廃棄物
公開シンポ

「受け入れ拡大には反対」
市民から厳しい意見相次ぐ

有害物質であるポリ塩化ビフェニール（PCB）廃棄物の受け入れ拡大を環境省から要請されている北九州市は22日、同市若松区の若松市民会館で、公開シンポジウムを開き、市民ら約150人が参加した。市民からは「これ以上の受け入れには反対」などの厳しい意見が相次いだ。

同省は昨年10月、日本環境安全事業（JESCO）北九州事業所でのPCB無害化処理について、完了期間を2015年3月から24年3月まで延長し、新たに計6000トンを受け入れるよう市に要請した。

シンポジウムでは同省や事業所の担当者が、処理期

PCB廃棄物 国か

計画変更に批判続出

室蘭で説明会

新たに1都3県分 完了延期
「押しつけ」市民怒り

政府全額出資の日本環境安全事業（東京）が室蘭市内の施設で行う有害なポリ塩化ビフェニール（PCB）廃棄物処理の安全性を監視する円卓会議が15日、市内で開かれた。環境省が首都圏の小型廃棄物などを追加処理し、処理完了時期を遅らせる方針を固めたことについて、計画の甘さを指摘する声が相次いだ。（小沢弘和）

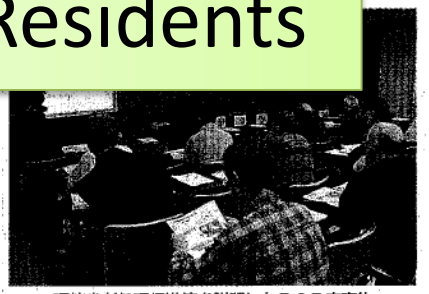
円卓会議で環境省は、1都3県の小型廃棄物約4300トンと東京の処理施設などの二次廃棄物約160トンを追加処理し、完了時期を10年遅い2025年度末とする方針を説明した。今の室蘭ではこれまでに道内と、東北や北関東など15県分を受け入れている。国内には把握できていない廃棄物が多数ある状況を踏まえ、室蘭の市民団体「PCB処理の安全性を考える会」の河野秋昭共同代表は「16道県分という約束が守られていない。まだ見つかっていない廃棄物は方針で考慮されていない」と批判し、さらに処理の終了期間が延びる可能性を指摘した。

別の参加者からは「以前から処理遅れを指摘していた。今の計画変更に納得できない」との意見が出た。

環境省産業廃棄物課の塚本直也課長は計画の甘さはご指摘通り」と理解を求めた。

同日夜に市中小企業センターで開かれた市民説明会には市民ら約40人が参加。環境省の担当者が計画変更に至った経緯について説明。市民からは「他の地域の処理を押しつけている」などの意見が出た。市民説明会は16日午後1時半から、幸町の市文化センターでも開かれる。

PCB処理の計画変更方針について議論した監視円卓会議



環境省が処理促進策を説明したPCB廃棄物処理事業検討要請説明会

環境省は15日、日本環境安全事業（JESCO）北海道事業所（室蘭市仲町）で東京事業所分のPCB使用安定器処理を室蘭市などに要請したことを受け、市内で開かれた北海道PCB廃棄物処理事業監視円卓会議と説明会で全体計画を示した。

出席者からは、国の処理計画の甘さや「期限内に処理できるのか」といった厳しい声が上がった。

「全体計画は、全国5事業所のうち安定器処理の見通しが立たない東京、豊田、大阪分について、北海道で東京分（4300トン）、北九州で豊田と大阪分（4千トン）をそれぞれ処理する内容。

逆に北海道で処理が困難な、超大型のトランス6台のうち5台を東京、特殊コンデンサ14千台中500台を大阪が処理する。同省は5事業所の得意分野

「発生地で処理すべき」
出席者から厳しい声

室蘭でPCB処理
拡大要請の説明会

Modifications made for improvement in processes

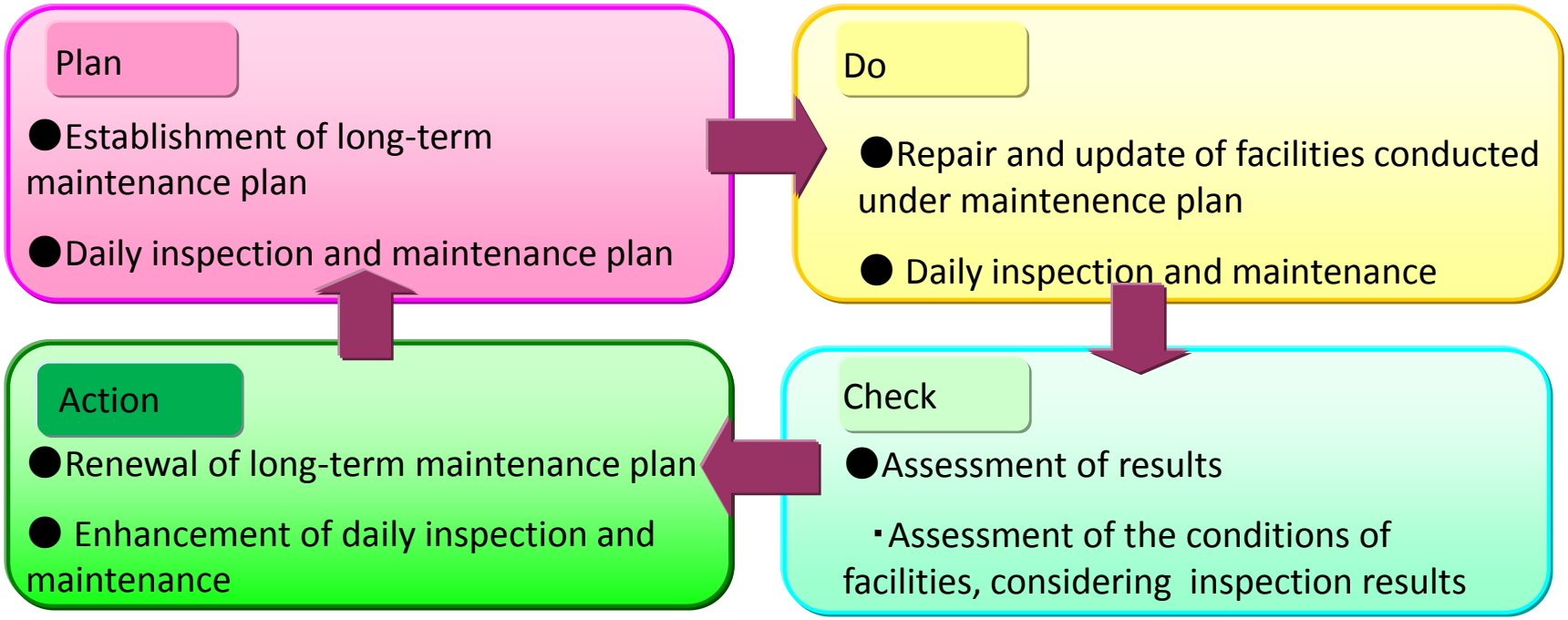
Facility	Measures Taken
Osaka 	●Treatment line for small transformers was re-created in 2013 so that transformers weighing 2.5 tons to 5 tons can be dismantled there.
Toyota 	●Additional cleaning stations were built in 2012 to treat train-mounted transformers . ●Dismantle area for small transformers was re-created in 2013 to treat special capacitors, leaking capacitors and containers ●Dismantle area for large transformers was re-created in 2014 and 2015, so that special capacitors can be treated.
	●Modifications of original facilities and improvements in handling in 2012 and 2013 enabled efficient pre-treatment, which lead to an increase of PCB wastes treated at Tokyo Facility.
	●Treatment line for small transforms were modified in 2014 and 2015, which made it possible to treat large capacitors there.

Ensuring the Health of Facilities

Measures under long-term maintenance plan

○To prevent troubles caused by deterioration due to aging, long-term maintenance plan has been established, and facilities are to be repaired and updated under plan

- Plan established according to past maintenance results and information from equipment and plant manufactures
- Plan will be renewe every year according to new maintenance records.



Measures to Prevent Troubles before They Occur

- JESCO has rechecked all troubles that have occurred in the past, and has given feedback to all five JESCO facilities
- JESCO has rechecked system for safety control of operations, and will make enhancement where needed.

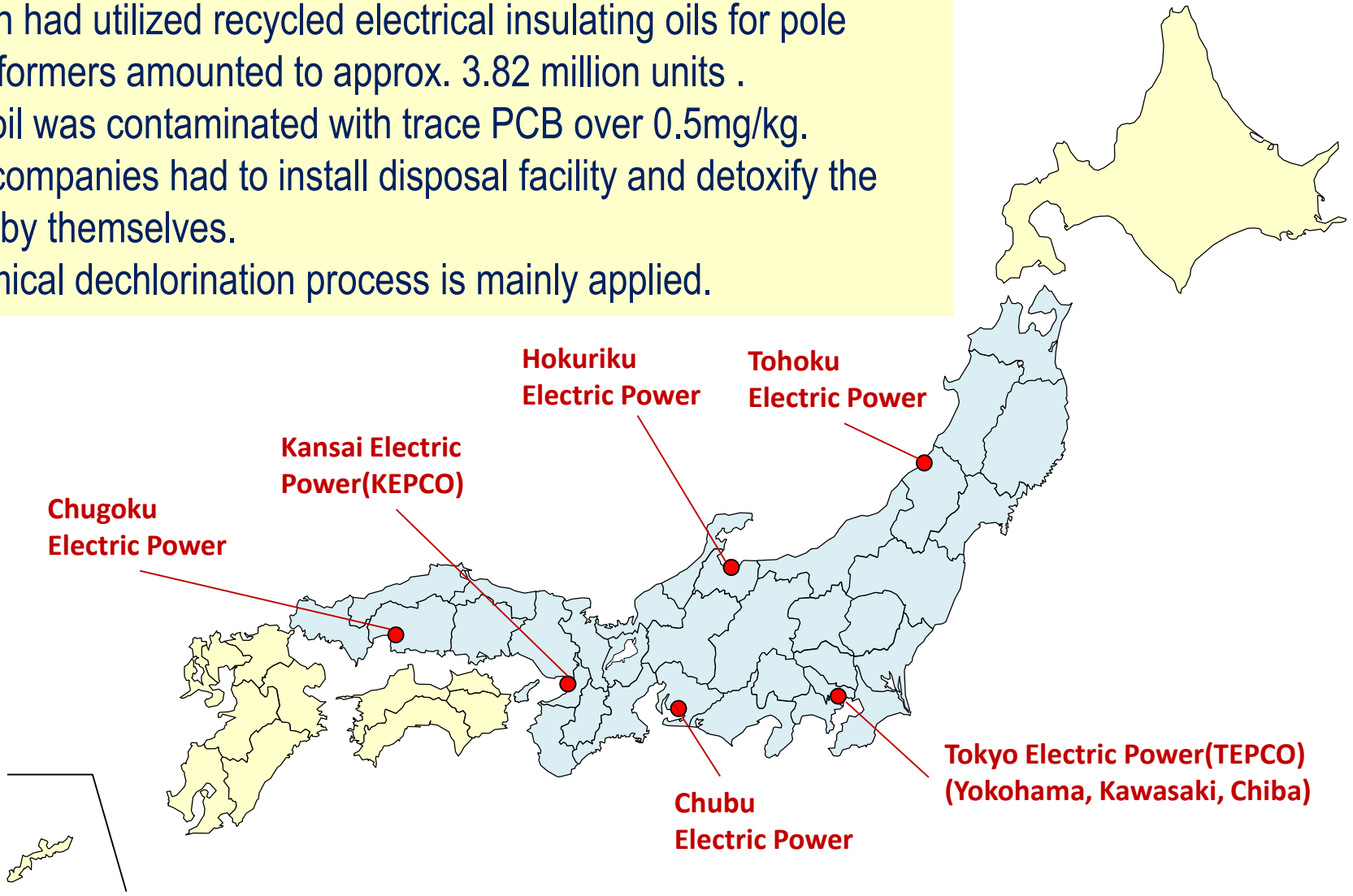
Actions to be taken in the future

○ JESCO headquarters has rechecked all troubles that have occurred in the past, and has given feedback to all five JESCO facilities. JESCO's five facilities will take precautions to prevent them.

○ To ensure the prevention of troubles, JESCO has rechecked system for safety control of operations(including JESCO headquarters, JESCO's five facilities, operation companies, plant manufactures and other related companies), and will make enhancement where needed.

Treatment of Pole Transformers Contaminated with PCB derived from Recycled Insulating Oils by Electric Power Companies

- Six electric power companies situated in the main island of Japan had utilized recycled electrical insulating oils for pole transformers amounted to approx. 3.82 million units .
- The oil was contaminated with trace PCB over 0.5mg/kg.
- The companies had to install disposal facility and detoxify the PCB by themselves.
- Chemical dechlorination process is mainly applied.



Procedure of Certification by MOE

Applicant

•Items of Application

- •Place of installation, disposal method and capacity
- •Type of waste to be treated
- •Plan of facility Installation and structure
- •Plan of operation and maintenance
- •Result of demonstration test
- •Evidence of scientific and technological theory

Report of Environmental Impact Assessment

Air Quality, Noise, Vibration, Odor, Water Quality, Ground Water

Application

The Minister of MOE

Notification & Public Inspection

- •Notification regarding place of facility, type of PCB wastes, etc.
- •Public inspection – One month
- •Opinion hearing from related regional governments
- •Opinion hearing from stakeholders

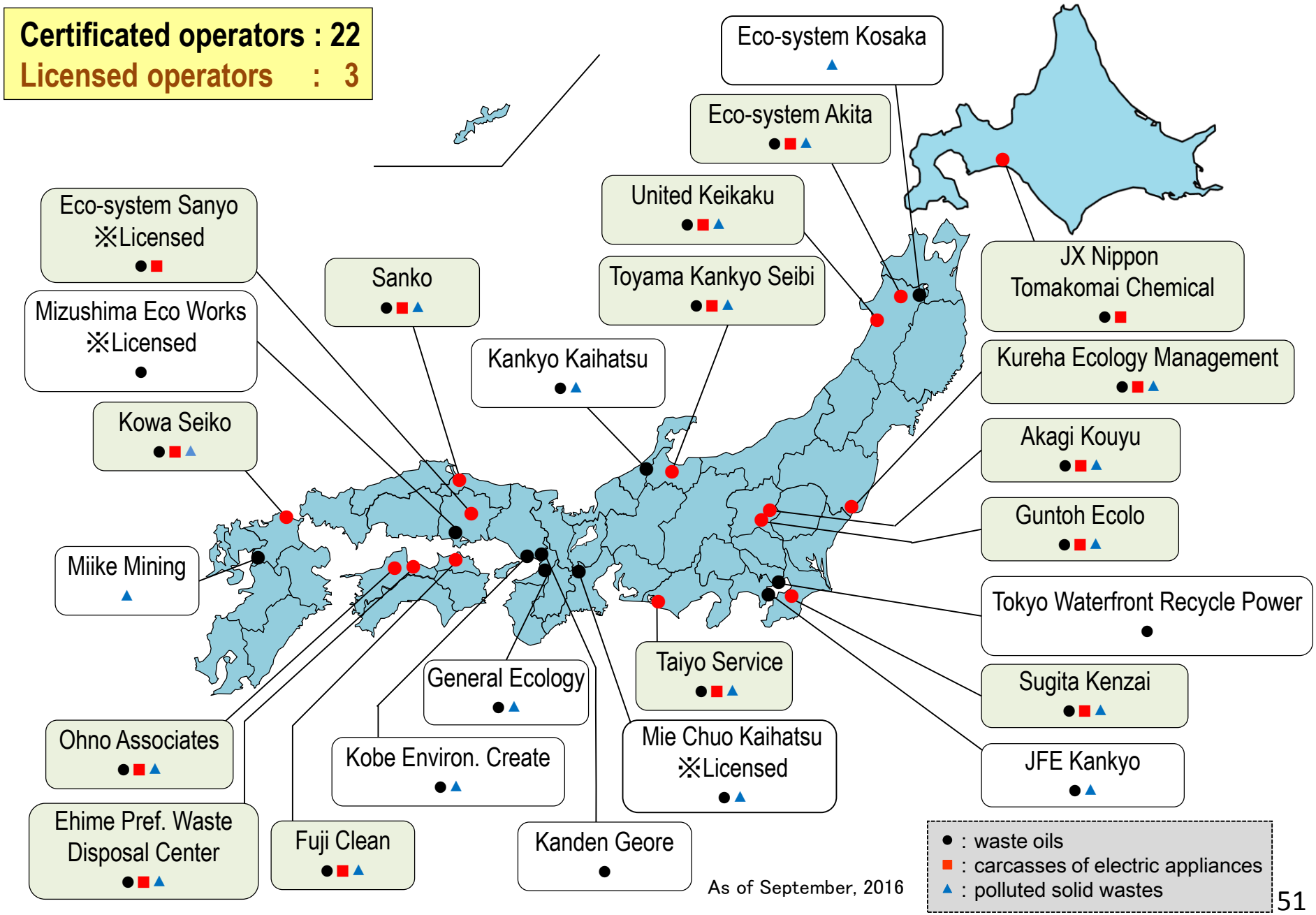
Hearing of opinions from experts

Evaluation of Suitability for Required Regulations

- •Regulations for detoxifying method
- •Regulations for applicant's eligibility and ability
- •Regulations for treatment facility

Approval

Certificated and Licensed Operators by Incineration



Treatment of PCB-contaminated Transformers by Fixed-bed type Furnace

Fixed Bed type Furnace

- Transformers are heated in a heating furnace by keeping up over 850℃ for 4 hours.
- Separated gas is transferred to secondary combustion zone of main incinerator and then decomposed.

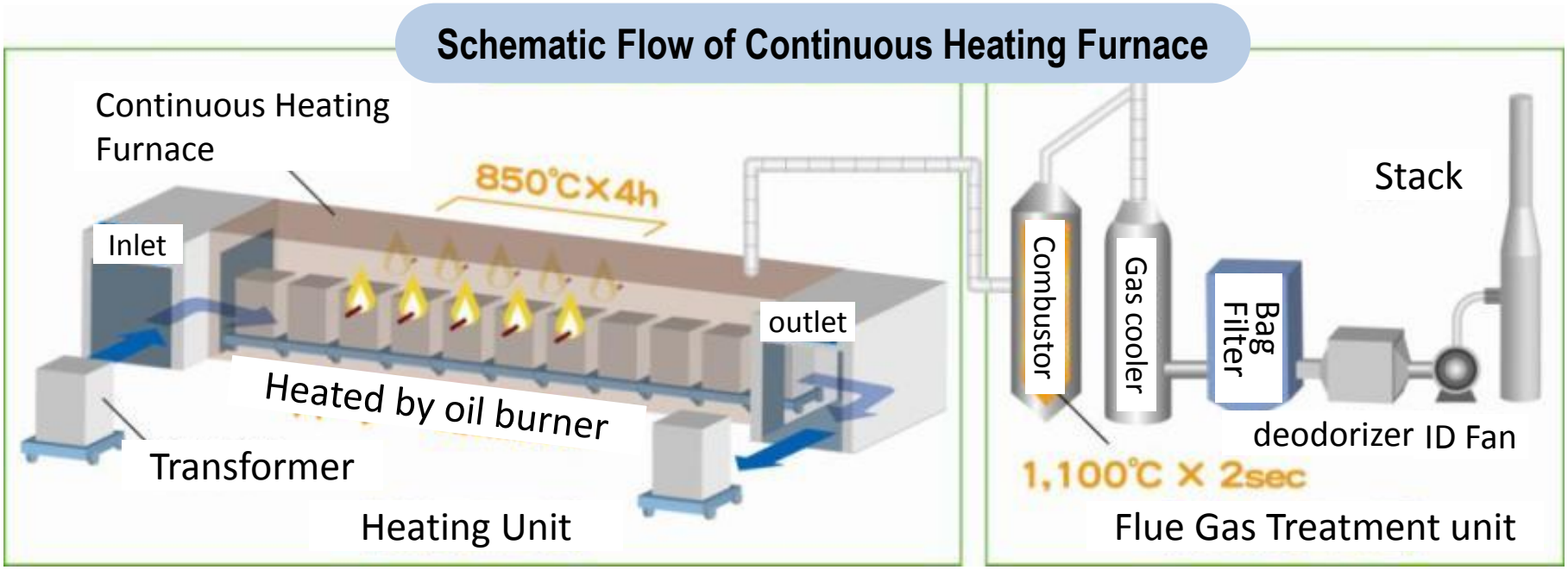
Before

After

Photos provided by Kowa Seiko

Treatment of PCB Contaminated Electrical Equipment by Continuous Heating Furnace

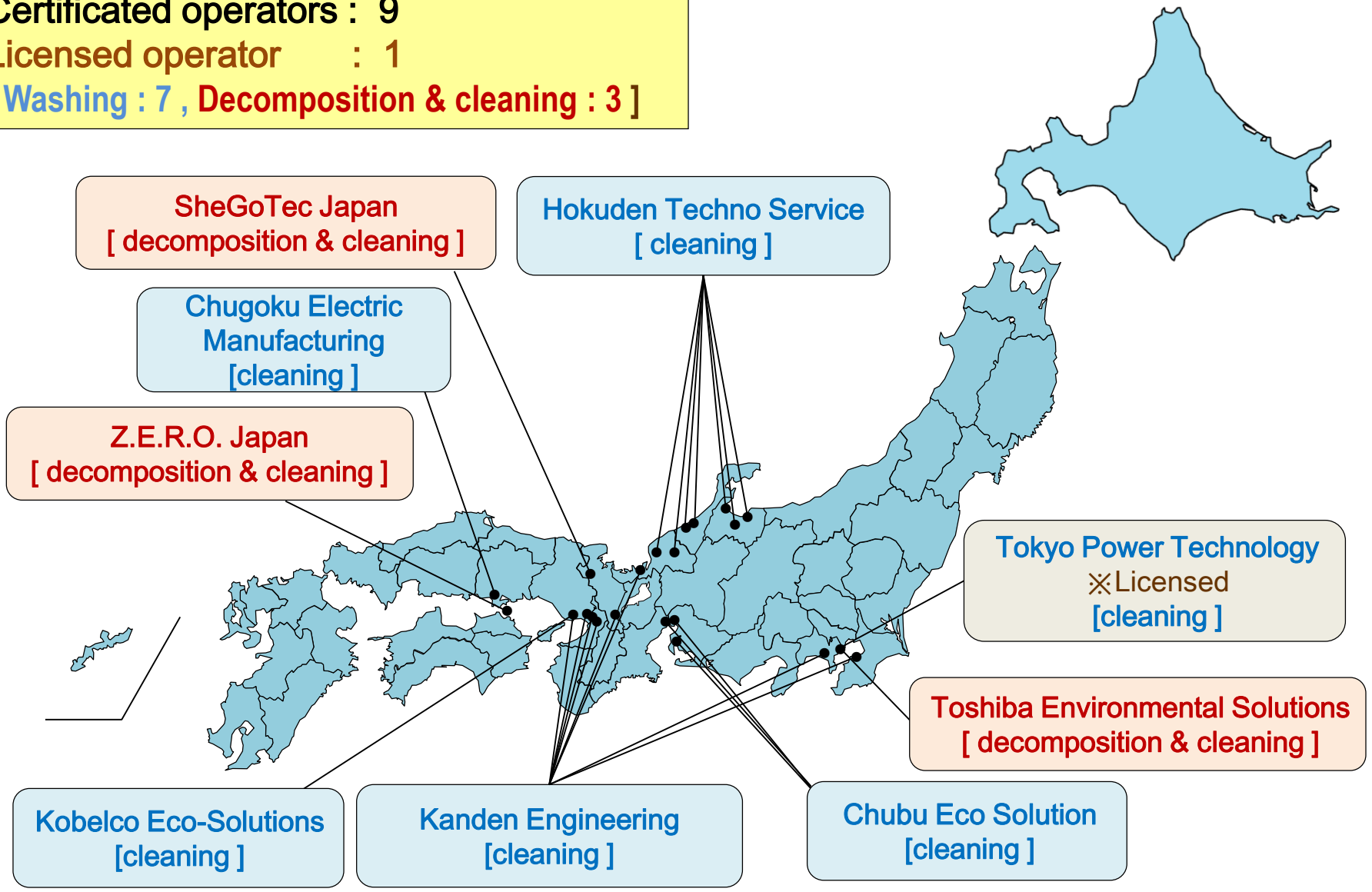
- Oil drained transformers or capacitors are charged into continuous heating furnace
- Transformers are heated up under the conditions of over 850°C and 4 hours during traveling through the furnace
- Generated gases are transferred to flue gas treatment facility and then detoxified by combustion



Provided by DOWA Eco-System

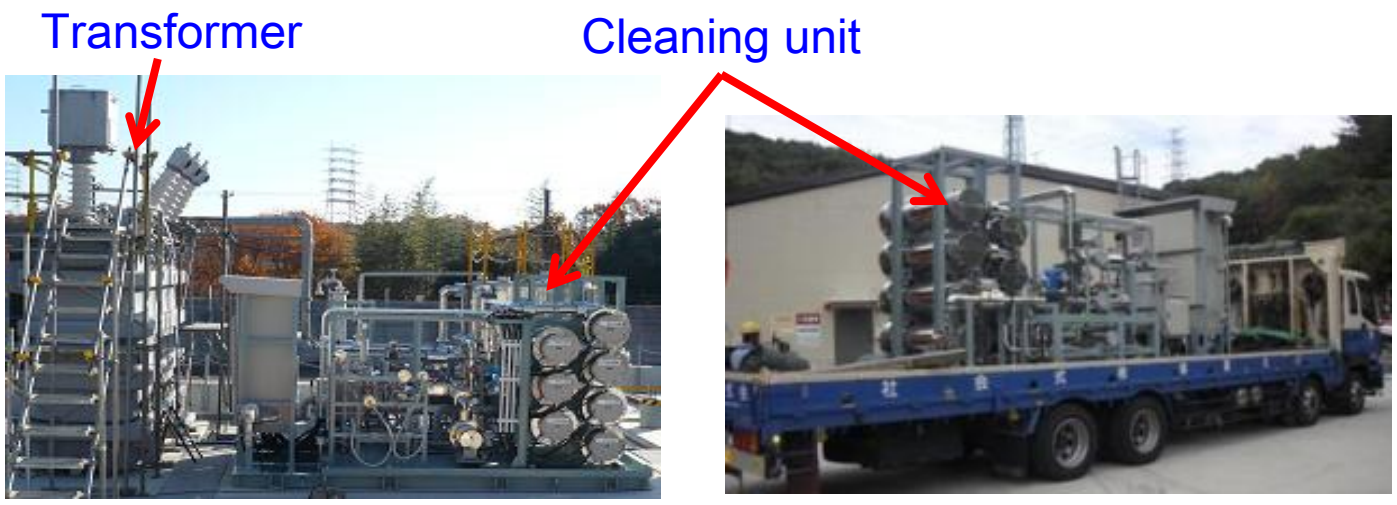
Certificated and Licensed Operators by Cleaning

Certificated operators : 9
Licensed operator : 1
[Washing : 7 , Decomposition & cleaning : 3]



On-site Treatment of Larger Transformers by Cleaning

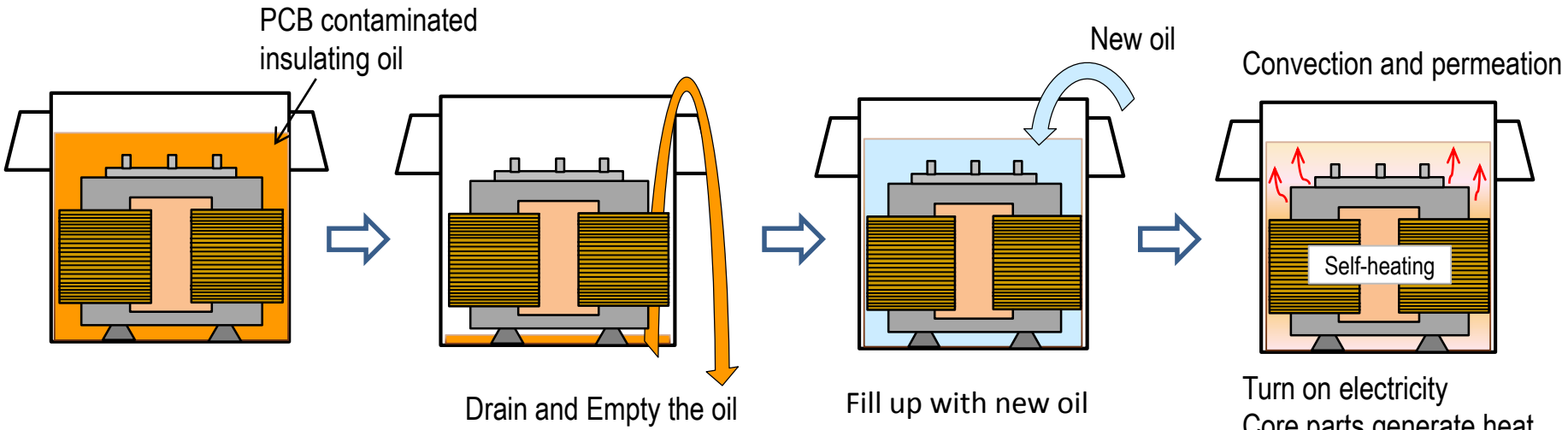
- The method of on-site cleaning is applied to a larger PCB-contaminated transformer which is difficult to transport.
- Cleaning unit equipped with tanks, pumps and sometimes heaters loaded on trailer is placed nearby the transformer and connected .
- After drained the oil, cleaning fluid, such as hydrocarbon solvent or new insulating oil is filled up the transformer.
- After circulating several hours, the fluid is drawn out, and then inner parts are taken out to verify the standards set for each constituents.



Photos provided by KEPCO

Method for Cleaning PCB Contaminated Transformer in Use

So-called "Retrofilling" was stipulated even in Japan as a cleaning technology applied to PCB contaminated transformers in use in 2015.



Turn on electricity
Core parts generate heat
Oil starts circulating naturally
Penetrated PCBs in cores permeate in the oil
PCB level becomes equalizing

Permitted applied conditions

- PCB level : not exceeding 5 ppm
- Oil volume in transformer : not less than 2000 L
- Actual turning time : over 90 days
- PCB level in the oil after 90 days : below 0.3 ppm

Immediate Action and Measures to Eliminate Low-level PCB Wastes

1. To understand actual numbers and conditions of existing low-level PCB wastes as well as PCB-contaminated electrical appliances in use
2. To increase numbers and capacities of detoxifying facilities, and also to develop various and practical processes enable to lower the processing cost
3. To promote the dissemination of importance to complete low-level PCB wastes elimination at the earliest by the end of March 2027

Overview of Amendments to PCB Special Measures Law (2)

The Law

・Revised and enforced in 2016 to ensure that PCB waste treatment be carried out as soon as possible. Below are the four main amendments:

1. Cabinet decision on a basic plan for PCB waste treatment (Article 6)

Ensures that the entire government tackles the issue together

2. Mandatory disposal of highly concentrated PCB waste (Articles 10, 12, 18, 20 & 33)

Waste holders are required to dispose of all PCB wastes before the Deadline for Completion of Scheduled Treatment . Those that fail may be issued with an order for improvement. Owner operators with products in use that contain highly concentrated PCBs must also dispose of them before the deadline.

3. Strengthening of report collection and on-site inspection authority (Articles 24 & 25)

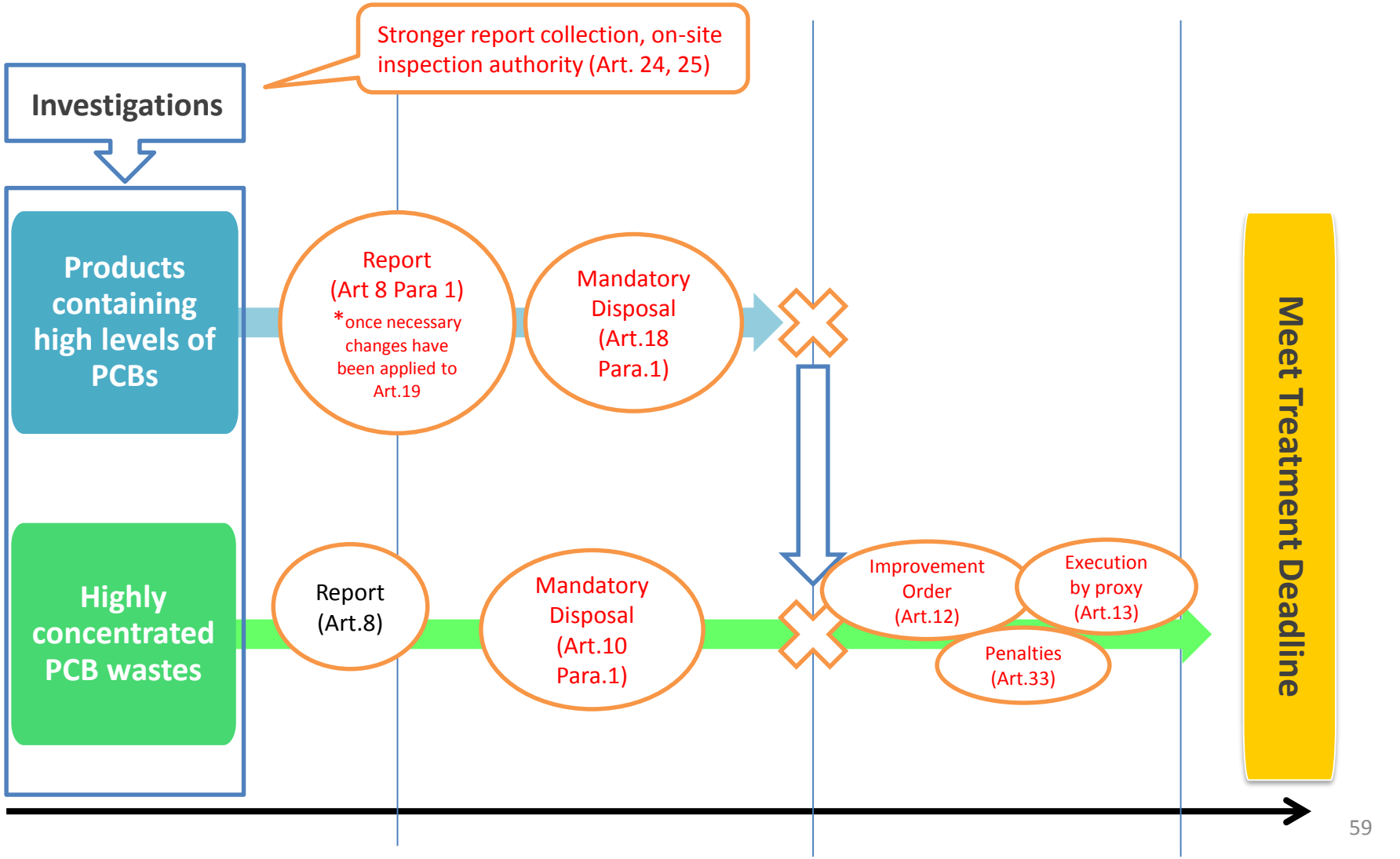
Prefectural governments now have stronger powers to demand reports and to conduct on-site inspections against highly concentrated PCB wastes not reported.

4. Disposal of highly concentrated PCB waste by proxy (Article 13)

In the case where a waste holder is not known, prefectural governments may carry out disposal of highly concentrated PCB wastes by proxy.

Measures of the amended law [Note: Red denotes additional measures]

The Cabinet set forth its basic PCB treatment plan to ensure the entire government tackle the issue together (Art.6)



Background of the revision: Challenges in meeting the treatment deadline (2)

Challenge: Handling products that contain highly concentrated PCBs

- Although it is known there is a **considerable number of products containing high levels of PCBs**, it will be difficult in practice to handle any waste discharged after the treatment deadline.

Number of products containing highly concentrated PCBs in use (according to notifications submitted under PCB Special Measures Law)

(As of end Mar 2015)

JESCO Facility	Transformers	Capacitors	Ballasts
Kitakyushu	54	980	20,828
Osaka	162	1,141	18,654
Toyota City	106	1,724	12,774
Tokyo	146	1,510	22,622
Muroran, Hokkaido	82	1,059	20,070
TOTAL	**550**	**6,414**	**94,948**

Response

Mandatory disposal of highly concentrated PCB waste (Articles 10, 12, 18, 20 & 33)

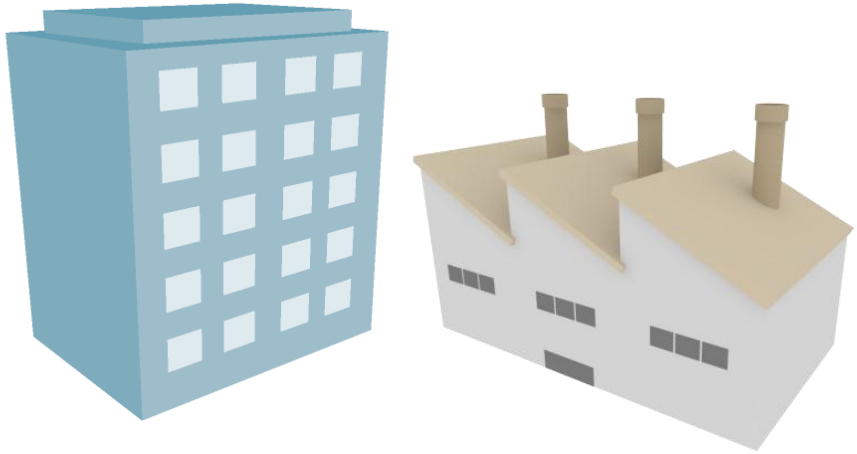
Waste holders are required to dispose of all PCB wastes before the Deadline for Completion of Scheduled Treatment. Those that fail may be issued with an order for improvement. Owner operators with products in use that contain highly concentrated PCBs must also dispose of them before the deadline.

Background of the revision: Challenges in meeting the treatment deadline (1)

Challenge: Strengthening Investigations

- The current reality is that some PCB wastes have not been reported. **It is impossible to know the full situation.** Moreover, it is estimated that there is a considerable number of products still in existence that contain PCBs.
- Each municipality is in the process of investigating mainly through questionnaire surveys to assess actual use of products using highly concentrated PCBs and storage of PCB wastes. But there's a **limit to the guidance that local government can carry out.** With a 50% response rate, investigations are getting bogged down.
- But **local government is not empowered to inspect** owners of products containing PCBs or places where it is not known whether they are storing PCB wastes.

【Targets for Investigations】
Transformer & capacitor: 860,000 personnel who install non-utility electrical workpieces
Ballast: facilities or workplaces built before 1977



Response

Strengthen report collection and on-site inspection authority (Articles 24 & 25)
Prefectural governments have stronger powers to demand reports and to conduct on-site inspections against highly concentrated PCB wastes not reported.

[Reference] Amount of highly concentrated PCB wastes in storage and treated

Number of highly concentrated PCB wastes being stored

(According to the notification submitted under PCB Special Measures Law)

(As of end of Mar 2015)

	Transformers	Capacitors	Ballasts
Kitakyushu	152	1,423	141,537
Osaka	412	3,576	1,037,094
Toyota	921	2,830	739,698
Tokyo	1,260	227,796	2,206,743
Muroran, Hokkaido	926	2,487	757,567
Total	3,671	238,112	4,882,639

Number of highly concentrated PCB wastes that were treated

(As of end of Mar 2015)

	Transformers	Capacitors	Ballasts
Kitakyushu	2,559	45,305	964,762
Osaka	2,335	53,953	0
Toyota	1,805	38,327	0
Tokyo	2,776	35,555	0
Muroran, Hokkaido	3,088	42,452	448,129
Total	12,563	215,592	1,412,891

Background of the revision: Challenges in meeting the treatment deadline (3)

Challenge: Ensuring treatment of highly concentrated PCB waste

- Although operators have submitted notification of storage, a **considerable number are unlikely to dispose of their consignment through JESCO**. Also, where the waste holder is either unknown or is bankrupt, **treatment has been stalled**.
- However, the existing PCB Special Measures Law did not specify the measures to be taken under improvement orders issued to operators that fail to meet the Deadline for Completion of Scheduled Treatment .

Highly concentrated PCB wastes registered with JESCO (As of end Mar 2014)

	Transformers	Capacitors	Ballasts
Notified (in use + as waste)	6,322	118,575	4,701,198 *9,967 tons
Registered (untreated only)	3,502	109,396	1,507 tons
Proportion of registered/ notified	55%	92%	15%

*NOTE: The amount of ballasts was estimated based on notifications

Unknown or bankrupt waste holders

	High PCB concentration	Unknown concentration
Number of waste holders	**147**	**74**
Transformers	8	59
Capacitors	482	126
Ballasts	13	0
Contaminated machinery	2pcs. + 842kg	2pcs. + 583kg
Small machinery	0	136,381
Others)	2	9

Based on results of questionnaire surveys to local authorities

Response

Disposal of highly concentrated PCB waste by proxy (Article 13)

Where a waste holder is not known, prefectural governments may carry out disposal of highly concentrated PCB wastes by proxy.

Basic Idea of High-concentration PCB equipment in use and PCB waste

In order to accomplish basic plan, the following conditions must be met before the "Deadlines for Completion of Scheduled Treatment".

A Investigation on all remaining highly concentrated PCB products and wastes to be completed.

B The use of all PCB products in operation to be ceased.

C All highly concentrated PCB wastes to be registered under the PCB special measures law.

D All registered highly concentrated PCB wastes to be properly treated at JESCO after holders of the wastes entrust JESCO to treat their wastes.

Source: MOE 16th Meeting of committee for promotion of proper PCB waste treatment (Feb. 8, 2016)

Additional Measures for high-concentration PCB treatment

A Investigation on all remaining highly concentrated PCB products and wastes to be completed.

- Conduction of efficient and successful investigation on hidden PCBs with the cooperation of the central and local governments
- Measures to increase response rate of questionnaires
- Strengthening investigation on hidden PCB products in use

B The use of all PCB products in operation to be ceased.

- Conduction of efficient and successful investigation on hidden PCBs (as stated above)
- Utilizing data registered under PCB Special Measures Law and Electricity Business Act
- Measures to ban use of PCB products in operation
- Measures to ban use of transportation vehicles which use parts that include PCBs
- Strengthening of the cooperation of the parties involved

C All highly concentrated PCB wastes to be registered under the PCB special measures law.

- Conduction of efficient and successful investigation on hidden PCBs (as stated above)
- Development of efficient method to tell the PCB concentration level of product or waste
- Matching of the databases of registered products / wastes and treated wastes

D All registered highly concentrated PCB wastes to be properly treated at JESCO after holders of the wastes entrust JESCO to treat their wastes.

- Promotion for PCB owners to commission JESCO to treat their PCBs
- Measures to cope with bankruptcy, deaths, succession disputes of PCB owners.
- Measures to maintain safety of PCB treatment facilities

Source: MOE 16th meeting of committee for promotion of proper PCB waste treatment (Feb. 8, 2016)

JESCO continues to ensure the safe and proper treatment with the understanding and trust of local people, and under the direction of national/local governments, and makes its utmost efforts to complete the treatment of high-level PCB waste in Japan as soon as possible.

Thank you.