### Mitigation

<table>
<thead>
<tr>
<th>Issues</th>
<th>As of Apr. 17</th>
<th>Step 1 (around 3 months)</th>
<th>Step 2 (through the end of this year)</th>
<th>Mid-term issues (around 3 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Cooling</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(1) Reactor Injection</td>
<td></td>
<td></td>
<td>Cold shutdown condition</td>
<td></td>
</tr>
<tr>
<td>Fresh water Injection</td>
<td></td>
<td>Circulating water cooling (start) ☆</td>
<td></td>
<td>Protection against corrosion cracking of structural materials*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Circulating water cooling (continued)</td>
<td></td>
<td>Partially ahead of schedule</td>
</tr>
<tr>
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<td></td>
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</tr>
<tr>
<td>(2) Spent Fuel Pool</td>
<td></td>
<td>Reliability improvement in injection operation / remote-control operation *ahead of schedule</td>
<td>Installation of full-fledged water processing facilities</td>
<td></td>
</tr>
<tr>
<td>Fresh water Injection</td>
<td></td>
<td>Circulation cooling system (installation of heat exchanger) ☆</td>
<td>Decontamination ☆ / desalination processing (reuse), etc</td>
<td>Continuous processing of accumulated water</td>
</tr>
<tr>
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</tr>
<tr>
<td>(3) Accumulated Water</td>
<td></td>
<td>Installation of storage / processing facilities ☆</td>
<td>Expansion ☆ / consideration of full-fledged processing facilities</td>
<td>Installation of full-fledged water processing facilities</td>
</tr>
<tr>
<td>with high radiation level</td>
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<tr>
<td>Storing water with low radiation level</td>
<td></td>
<td>Installation of storage facilities / decontamination processing</td>
<td>Storage / management of sludge waste etc. ☆</td>
<td>Continuously processing of accumulated water</td>
</tr>
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</tr>
<tr>
<td>(4) Groundwater</td>
<td></td>
<td>Installation of reactor building cover (Unit 1) ☆</td>
<td>Design / implementation of impermeable wall against groundwater</td>
<td>Mitigation of contamination in the ocean</td>
</tr>
<tr>
<td>Mitigation</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>(5) Atmosphere / Soil</td>
<td></td>
<td>Mitigation of contamination in groundwater</td>
<td>(Restoration of sub-drainage pumps with expansion of storage / processing facilities)</td>
<td>Establishment of impermeable wall against groundwater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consideration of method of impermeable wall against groundwater</td>
<td>Design / implementation of impermeable wall against groundwater</td>
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<tr>
<td></td>
<td></td>
<td>Dispersion of inhibitor (continued)</td>
<td>Removal / management of debris (continued)</td>
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<tr>
<td></td>
<td></td>
<td>Dispersion of inhibitor</td>
<td>Removal / management of debris</td>
<td></td>
</tr>
</tbody>
</table>

*partially ahead of schedule
<table>
<thead>
<tr>
<th>Issues</th>
<th>As of Apr. 17</th>
<th>Step 1 (around 3 months)</th>
<th>Step 2 (through the end of this year) current status (as of Oct. 17)</th>
<th>Mid-term issues (around 3 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III. Monitoring / Decontamination</td>
<td></td>
<td>Expansion, enhancement and disclosure of radiation dose monitoring in and out of the power station</td>
<td>Decontamination / Mitigate disasters</td>
<td>Continuous environmental monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consideration / start of full-fledged decontamination</td>
<td>Continuous decontamination</td>
</tr>
<tr>
<td>IV. Countermeasures for aftershocks, etc.</td>
<td>Establishment of countermeasures against aftershocks and tsunami, preparation for various countermeasures for radiation shielding</td>
<td></td>
<td>Reinstallation work of each Unit</td>
<td>Continue various countermeasures for radiation shielding</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>☆ Installation of supporting structure ★</td>
<td>Reinforcement work of each Unit</td>
</tr>
<tr>
<td>V. Environment Improvement</td>
<td></td>
<td>Improvement of workers’ living / working environment</td>
<td>Improvement of workers’ living / working environment</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Improvement of radiation control / medical system</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Systematic implementation of staff training / personnel allocation</td>
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<tr>
<td></td>
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<td></td>
<td>Establishing plant operation plan based on the safety concept</td>
<td></td>
</tr>
<tr>
<td>Action plan for mid-term issues</td>
<td></td>
<td></td>
<td>Government’s concept of securing safety</td>
<td></td>
</tr>
</tbody>
</table>

Red colored letter: newly added to the previous version, ★: already reported to the government, Green colored shading: achieved object.
Overview of Major Countermeasures in the Power Station as of October 17

Underlined: deleted countermeasures, red colored: newly added countermeasures, ☆: already reported to the government

- Reactor building cover (5, 50, 54, 55, 84)
- Full-fledged container (50, 56)
- Cooling of spent fuel pool by external water injection (18, 22, 28)
- Nitrogen gas injection (2, 11, 15)
- PCV gas control (86)
- PCV venting (with filtration) (10)
- Flooding up to top of active fuel (3, 9)
- Injection of fresh water with pumps (1)
- Installation of heat exchangers (13)

- Sampling of steam/pool water and measurement of radioactive materials (19)
- Circulation cooling of spent fuel pool (23, 24, 25, 27)

- Water processing facility
- Desalination
- Decontamination
- Adsorption
- Oil separation

- Cooling at minimum water injection rate (7, 12, 14)
- Reuse of processed water (45)
- (Implement circulating water cooling)
- Processing high radiation-level water (31, 38, 43)

- Storage / management of sludge waste etc. (81)

- Storage of high radiation-level water (30, 32, 37, 39, 42)

- Installation of supporting structure under the bottom of spent fuel pool (26)

- Prevent contamination of groundwater (66, 67);
  Consideration of impermeable wall against groundwater (68, 83)

- Improvement of living/working environment of workers (74, 75);
  Improvement of site environment (76)

- Enhance countermeasures against tsunami (69, 70);
  Consideration / start of full-fledged decontamination (63)

- Preventive measures against leakage of high radiation-level water (29)

- Prevent contamination in the ocean (64)

- Isolation of high-level radioactive water (65)

- Install various interconnecting lines of offsite power (8)

- Continue/Enhance monitoring (55-62),
  Consideration of full-fledged water processing facilities (82)

- Seismic assessment (20)
- Continued monitoring (21),
  (Unit 4) Installation of supporting structure under the bottom of spent fuel pool (26)

- Various countermeasures of radiation shielding (72, 73)

- Install various interconnecting lines of offsite power (8)

- Continue/Enhance monitoring (55-62),
  Consideration / start of full-fledged decontamination (63)
Current Status of Countermeasures (1)

### Reactor Cooling

#### Unit 1
- **Implementation of circulating water cooling [Countermeasures 12,14,45]**
  - Construction of centralized monitoring system in the main anti-earthquake building (Sep. 30)
  - Injection of water required to achieve "stable cooling"
- **Nitrogen gas injection [Countermeasure 11]**
  - Injection toward cold shutdown condition without increasing the amount of accumulated water
- **Implementation of circulating water cooling [Countermeasures 12,14,45]**
  - Establishment of centralized monitoring system in the main anti-earthquake building (Sep. 30)
  - Change injection flow rate experimentally, and verify transition of reactor temperatures
  - Injection toward cold shutdown condition without increasing the amount of accumulated water

#### Unit 2
- **Implementation of circulating water cooling [Countermeasures 12,14,45]**
  - Injection of water required to achieve "stable cooling" (Inject water through core spray line in addition to feed water line (Sep. 14))
  - Change injection flow rate experimentally, and verify transition of reactor temperatures
- **Nitrogen gas injection [Countermeasure 11]**
  - Injection toward cold shutdown condition without increasing the amount of accumulated water

#### Unit 3
- **Implementation of circulating water cooling [Countermeasures 12,14,45]**
  - Injection of water required to achieve "stable cooling" (Inject water through core spray line in addition to feed water line (Sep. 1))
  - Change injection flow rate experimentally, and verify transition of reactor temperatures
- **Nitrogen gas injection [Countermeasure 11]**
  - Injection toward cold shutdown condition without increasing the amount of accumulated water

---

**Legend**
- Green: Implemented (monitored by government as necessary)
- Red frame: progressed countermeasures from the previous version.
- ⚫: already reported to the government
- Under construction
- Field work started
- Field work not started yet

### Current Status (as of Oct. 17)

- **Start of Step 2 (Jul. 17)**
- **<Step 2 (through the end of this year)>**: Release of radioactive materials is under control and radiation dose is being significantly held down

### Target (1) Cold shutdown condition

#### Term to keep the amount of accumulated water and to improve reliability

#### Term to complete measures to improve reliability and reduce the amount of accumulated water

#### Term to inject enough water for cold shutdown condition without increasing the amount of accumulated water

### Temperature at the bottom of RPV (upper) and water injection flow rate (lower)

<table>
<thead>
<tr>
<th>Date</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8/17</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9/17</td>
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<td></td>
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</tr>
<tr>
<td>10/18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graph:

- **Temperature at the bottom of RPV (upper)**
- **Water injection flow rate (lower)**

---
Current Status of Countermeasures (2)

- **Spent Fuel Pool**
  - **Cooling**
    - Water injection through normal cooling system [Countermeasure 24]
    - Cooling by installation of heat exchanger [Countermeasures 25,27]
      - Circulating water cooling operation (from Aug. 10)
    - Cooling by installation of heat exchanger ☆ [Countermeasures 25,27]
      - Circulating water cooling operation (from May 31)
    - Cooling by installation of heat exchanger ☆ [Countermeasures 25,27]
      - Circulating water cooling operation (from Jun. 30)
    - Cooling by installation of heat exchanger ☆ [Countermeasures 25,27]
      - Circulating water cooling operation (from Jul. 31)
    - Restoration of injection through normal cooling system [Countermeasure 24]
      - Water injection by installation of alternative system to “Giraffe” (Jun. 17)
    - Desalination of Spent Fuel Pool water (from Aug. 20)

- **Target**
  - More stable cooling

**Legend**
- Green: Implemented (monitored by government as necessary)
- Star: Safety check by government (reported)
- Under construction
- Field work started
- Field work not started yet

**Current status (as of Oct. 17)**

- Start of Step 2 (Jul. 17)
- Release of radioactive materials is under control and radiation dose is being significantly held down through the end of this year
- Current status

**Legend**
- Red frame: progressed countermeasures from the previous version
- Star: already reported to the government

---

*Note: The diagram provides a visual representation of the current status and countermeasures for the spent fuel pool, detailing the implementation and progress of various cooling and safety measures.*
<table>
<thead>
<tr>
<th>Issue</th>
<th>Current status (as of Oct. 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>II. Mitigation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>(3) Accumulated Water</strong></td>
<td></td>
</tr>
<tr>
<td><strong>[ High level ]</strong></td>
<td></td>
</tr>
<tr>
<td>Term to keep the amount of accumulated water and to improve reliability</td>
<td>Term to complete measures to improve reliability and reduce the amount of accumulated water</td>
</tr>
<tr>
<td>Elimination, continuous processing and system enhancement of accumulated water in the building [Countermeasure 43]</td>
<td>Elimination, continuous processing and system enhancement of accumulated water in the building [Countermeasure 43]</td>
</tr>
<tr>
<td>Construction of Cesium adsorption facilities (SARRY)</td>
<td>Processing start (Aug. 18)</td>
</tr>
<tr>
<td>Construction of desalination facilities (distillation) (term I)</td>
<td>Test operation</td>
</tr>
<tr>
<td>Preparation for desalination facilities (distillation) (term II)</td>
<td>Installation (term II)</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td>Capable of processing (term II) (Oct. 10)</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td>Capable of processing (Jul. 20)</td>
</tr>
<tr>
<td><strong>Consideration of full-fledged water processing facilities [Countermeasure 82]</strong></td>
<td></td>
</tr>
<tr>
<td>Storage / management of sludge Waste etc. [Countermeasure 81]</td>
<td>Continue storage / management of sludge waste etc. [Countermeasure 81]</td>
</tr>
<tr>
<td>Design of additional storage facility</td>
<td>Preparation</td>
</tr>
<tr>
<td>Installation of desalination facilities (reverse osmosis) (term II)</td>
<td>Installation</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td></td>
</tr>
<tr>
<td><strong>[ Low level ]</strong></td>
<td></td>
</tr>
<tr>
<td>Continue decontamination [Countermeasures 44,46]</td>
<td></td>
</tr>
<tr>
<td>- Decontamination with decontaminant (zeolite) (May 1)</td>
<td></td>
</tr>
<tr>
<td><strong>Target (3) Decrease the total amount of accumulated water</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Low level</strong></td>
<td></td>
</tr>
<tr>
<td>Term to inject enough water for cold shutdown condition without increasing the amount of accumulated water</td>
<td></td>
</tr>
<tr>
<td>Elimination, continuous processing and system enhancement of accumulated water in the building [Countermeasure 43]</td>
<td></td>
</tr>
<tr>
<td>Construction of Cesium adsorption facilities (SARRY)</td>
<td>Processing start (Aug. 18)</td>
</tr>
<tr>
<td>Construction of desalination facilities (distillation) (term I)</td>
<td>Test operation</td>
</tr>
<tr>
<td>Preparation for desalination facilities (distillation) (term II)</td>
<td>Installation (term II)</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td>Capable of processing (term II) (Oct. 10)</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td>Capable of processing (Jul. 20)</td>
</tr>
<tr>
<td><strong>Consideration of full-fledged water processing facilities [Countermeasure 82]</strong></td>
<td></td>
</tr>
<tr>
<td>Storage / management of sludge Waste etc. [Countermeasure 81]</td>
<td>Continue storage / management of sludge waste etc. [Countermeasure 81]</td>
</tr>
<tr>
<td>Design of additional storage facility</td>
<td>Preparation</td>
</tr>
<tr>
<td>Installation of desalination facilities (reverse osmosis) (term II)</td>
<td>Installation</td>
</tr>
<tr>
<td>Installation work of desalination facilities (reverse osmosis) (term II)</td>
<td></td>
</tr>
<tr>
<td><strong>[ Low level ]</strong></td>
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</tr>
<tr>
<td>Continue decontamination [Countermeasures 44,46]</td>
<td></td>
</tr>
<tr>
<td>- Decontamination with decontaminant (zeolite) (May 1)</td>
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</tr>
</tbody>
</table>
### Current Status of Countermeasures (4)

**Issues**

- Implementation of preventions against expansion of groundwater contamination [Countermeasure 67]
  - Restoration of sub-drainage pumps with expansion of storage / processing facilities
- Design of impermeable wall against groundwater [Countermeasure 68]
- Confirmation of solidification of inhibitor [Countermeasure 52]
- Removal / management of debris [Countermeasure 53, 87]
  - Collected debris (Volume of approx. 900 containers (as of Oct. 17))
  - Management of collected debris etc. in storage areas
- Installation of reactor building cover (Unit 1) [Countermeasures 54, 55]
  - Under preparatory construction (Unit3: Jun. 20, Unit4: Jun. 24)
- Installation of PCV gas control system [Countermeasure 86]
  - Start installation work (Unit 1: Oct. 7, Unit 2: Oct. 10, Unit 3 (preparatory work): Sep. 30)

**Mitigation / Soil**

- Implementation of preventions against expansion of groundwater contamination [Countermeasure 67]
- Design of impermeable wall against groundwater [Countermeasure 68]
- Confirmation of solidification of inhibitor [Countermeasure 52]
- Removal / management of debris [Countermeasure 53, 87]
- Installation of reactor building cover (Unit 1) [Countermeasures 54, 55]
- Installation of PCV gas control system [Countermeasure 86]

### II. Mitigation

### III. Monitoring / Decontamination

- Continue to assess current release of radioactive materials from PCVs [Countermeasures 60, 61]
  - The current release rates from PCVs of Units 1 to 3 were assessed comprehensively utilizing the airborne radioactivity concentration (dust concentration) at the upper part of the reactor buildings, the land and the sea.
  - The current total release rate from Units 1-3 based on the assessment this time is estimated at approx. 0.1 billion Bq/h at the maximum (provisional figure), which is 1/8,000,000 of that at the time of the accident.
  - The radiation exposure per year at the site boundaries is assessed at approx. 0.2 mSv / year at the maximum (provisional figure) based on the aforementioned release rate (The target is 1 mSv / year. Excluding the effect of the radioactive materials already released until now).
  - Continuously implement the measurements of airborne radioactivity concentration at the upper part of reactor buildings, the land and the sea to grasp the reduction tendency of the release rate due to mitigation countermeasures.

### Consideration / start of full-fledged decontamination [Countermeasures 63]

Red colored letter: newly added countermeasures, Red frame: progressed countermeasures from the previous version, ☆: already reported to the government

<table>
<thead>
<tr>
<th>Target</th>
<th>Sufficiently reduce radiation dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>Step 2 (through the end of this year): Release of radioactive materials is under control and radiation dose is being significantly held down</td>
</tr>
</tbody>
</table>

### Start of Step 2 (Jul. 17)

Current status (as of Oct. 17)

- Installation of sub-drainage pumps (planned around the end of Oct.)
- Installation of impermeable wall against groundwater [Countermeasure 83] (planned around the end of Oct.)

### Target [2] Prevent scattering of radioactive materials

- Spraying treated water, which meets the guideline in the bathing area, in the NPS to prevent radioactive dust from scattering (Oct. 7)
- Installation of PCV gas control system [Countermeasure 86]
- Installation of reactor building cover (Unit 1) [Countermeasures 54, 55]
- Spraying treated water, which meets the guideline in the bathing area, in the NPS to prevent radioactive dust from scattering (Oct. 7)

### Target [4] Prevent scattering of radioactive materials

- Spraying treated water, which meets the guideline in the bathing area, in the NPS to prevent radioactive dust from scattering (Oct. 7)
- Installation of reactor building cover (Unit 1) [Countermeasures 54, 55]
- Installation of PCV gas control system [Countermeasure 86]

### Current Status of Countermeasures (4)

- Installation of sub-drainage pumps (planned around the end of Oct.)

Legend:
- Implemented (monitored by government as necessary)
- Safety check by government (reported)
- Under construction
- Field work started
- Field work not started yet
Current Status of Countermeasures (5)

<table>
<thead>
<tr>
<th>Issues</th>
<th>Step 2 (through the end of this year) Release of radioactive materials is under control and radiation dose is being significantly held down</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. Countermeasures against aftershocks, etc.</td>
<td>Start of Step 2 (Jul. 17)</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Current status (as of Oct. 17)</td>
</tr>
<tr>
<td>IV. Countermeasures against aftershocks, etc.</td>
<td>(Unit 4) Installation of supporting structure under the bottom of the fuel pool [Countermeasure 26]☆ (Jul: 30)</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Consideration of reinforcement work of each Unit [Countermeasure 71]</td>
</tr>
<tr>
<td></td>
<td>- Evaluation of seismic resistance has been completed (Aug.26)☆</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Continue various countermeasures for radiation shielding [Countermeasure 73]</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Continuation and enhancement of improvement of workers' living / working environment [Countermeasure 75]</td>
</tr>
<tr>
<td></td>
<td>- Accommodations for approx. 1,600 people have been prepared. Approx. 1,100 people have already moved in (as of Oct. 1)</td>
</tr>
<tr>
<td></td>
<td>- 20 on-site rest stations have been established (approx. 4,400m² in size with a capacity to accommodate approx. 1,500 people) (as of Oct. 5)</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Continuous improvement of radiation control [Countermeasure 78]</td>
</tr>
<tr>
<td></td>
<td>- Reinforcement of radiation control by NISA</td>
</tr>
<tr>
<td></td>
<td>- Expansion of whole-body counters, implementation of monthly internal exposure measurement ☆</td>
</tr>
<tr>
<td></td>
<td>- Automated recording of personal radiation dose, written notification of exposure dose ☆, introduction of workers' certificates with photos ☆</td>
</tr>
<tr>
<td></td>
<td>- Consideration of long-term healthcare such as enhancement of safety training for workers and establishing database etc.</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Continuous reinforcement of medical system [Countermeasure 80]</td>
</tr>
<tr>
<td></td>
<td>- Install new emergency medical facility, establish organization with resident specialists (on call 24 hours a day), speedy transportation of patients</td>
</tr>
<tr>
<td></td>
<td>- Intensive preventive measures against heat stroke ☆ (trainings for new workers), countermeasures for mental health, conducting medical examination, prevention and mitigation of flu</td>
</tr>
<tr>
<td></td>
<td>- Establish industrial hygiene system such as preventive healthcare</td>
</tr>
<tr>
<td>V. Environment improvement</td>
<td>Systematic staff training and personnel allocation [Countermeasure 85]</td>
</tr>
<tr>
<td></td>
<td>- Promote human resources training in conjunction with the government and operators</td>
</tr>
</tbody>
</table>

Legend:  
- Implemented (monitored by government as necessary)  
- Safety check by government (reported)  
- Under construction  
- Field work started  
- Field work not started yet