

CV-SALTS Management Practice Subcommittee

Effective Management Practices Evaluation for Salt and Nitrate **Version-10**

(Recommended for Approval by Technical and Executive Committees)

The Management Practice Subcommittee's (Subcommittee) charter is to assist CV-SALTS to improve salt and nitrate management through industry and community management practices, identifying and screening the management practices to improve implementation and monitoring of results. This document is part of the Management Practice Document Review developed in 2010 and 2011. This approach and process draw from others used to review stormwater¹ and water conservation practice and criteria.²

1 Management Practice Review Approach

At the recommendation of the CV-SALTS Committees or in accordance with the sector schedule below the Subcommittee will evaluate a management practices in accordance with the following process and standards. These standards will be used to screen management practices for inclusion in a "toolbox" of Effective or Beneficial Management Practices, generally referred to as Management Practices (MPs) in this document. These MPs have been vetted in the CV-SALTS process to assist others in reducing salinity and nitrate. This "toolbox" of MPs provides a range of new and existing MP options, their documented effectiveness, expected reductions, current status of implementation and cost when available. The listed practices provide early implementation opportunities and the basis to recommend reasonable implementation requirements for the Basin Plan Amendment. In addition, the "toolbox" identifies new technology and innovative practices that may provide further improvement and flexibility.

1.1 Products

A brief description of the products of the Subcommittee's efforts are described in the following sections.

1.1.1 Screening Tool

The Subcommittee uses the enclosed procedure and standards along with a related Nomination Form to evaluate the presence of adequate evidence and information to characterize the utility and efficacy of MP's to reduce or manage salt components and nitrates. The purpose of the screening tool and standards is to assist in the review of the scientific and monitoring documentation, not to perform that assessment or certify a practice for purposes other than those evaluated. The use of the screening tool requires that the Subcommittee (or help available to it) be able to understand the information provided

¹ International Stormwater BMP Database Performance evaluation
<http://www.bmpdatabase.org/MonitoringEval.htm#PerformanceEval>

² California Urban Water Conservation Example BMP Development <http://cuwcc.org/resource-center/technical-resources/bmp3-resources.aspx> EPA WaterSense Program Criteria
http://www.epa.gov/watersense/about_us/watersense_label.html

not necessarily be experts in the scientific area or the region it is being applied. The screening tool Nomination Form will result in practices added to the “toolbox”. The screening process will rely on groups, industries, and practice proponents to nominate and complete the nomination form and supporting information for evaluation. This process will be described in the sections below.

1.1.2 Toolbox of Practices

The Management Practice Subcommittee will utilize volunteers and technical support available to it to review and evaluate MPs that reduce salt constituents and nitrates of relevance to the Central Valley. Initially the “toolbox” may be a reviewed set of electronic documents for each practice with supporting materials. Later, as the number and diversity of practices increase, the “toolbox” format will likely need to become more sophisticated to facilitate its use. The “toolbox” and the practices were extensively discussed among the Subcommittee members.

The Subcommittee identified the best use of the “toolbox” as a source of documented and validated practices that regulated entities could use to develop their management plans for salinity and nitrate for both voluntary action and Regional Board consideration as part of the permittees plan or other regulatory programs.

A factsheet or summary technical document should be prepared for practices accepted into the “toolbox” so that potential users can easily evaluate the practices for their own use. Other examples of “toolbox” development include the Stormwater BMP Manual³ and the Salinity Guideline⁴. The Subcommittee however wants to ensure that users of the “toolbox” understand the need to evaluate any practice for their own application. Additionally, regulatory programs and permits should not inappropriately default to the “toolbox” as a requirement for any specific facility or location. Dischargers will be able to take advantage of the information developed on the treatment and control options provided in the “toolbox”, but the “toolbox” will not limit their options. Any discharger that wants to use an alternative approach to manage salt or nitrate will be able to submit information that will be evaluated by the same process the committee followed when creating the “toolbox”. This consistency will provide the discharger and Regional Board a clear understanding of how nominated practices perform relative to practices documented in the “toolbox”.

2 Process

The process for documenting new or developing practices and validated practices differ. The new and developing and validated practices are described in section 3 of this document. The process for each is summarized below (additional details or modifications may be made by the Subcommittee). After a call for and nomination of practices by an industry, the practices will be evaluated for acceptance in the “toolbox” with the screening tool, or further information and study may be requested and developed, as needed. . The Subcommittee may then recommend to the Executive Committee that the practice be included (or not) in the toolbox.

³ Stormwater Best Management Practice Handbooks, California Stormwater Quality Association, 2003, on the web at <http://www.cabmphandbooks.com/>

⁴ Salinity Management Guide, National Water Resources Institute, 2008 on the web at <http://www.salinitymanagement.org/>

Figure 1 Process Diagram



The Subcommittee will likely request support from the Technical Project Manager or contract for support or consulting entities where their support is needed to develop documentation. The Subcommittee will also propose projects for grant support or coordination with other efforts where this is consistent with MP development goals.

2.1 Sector Review Schedule

The Pilot Salt and Nitrate Source Implementation Study⁵ identified sources of salt. Each significant source of salt shown in the report will be scheduled for review. Review priority will be based on salt and nitrate loading that was reported in the pilot implementation study. This initial list and prioritization is intended as a guideline, and should not result in exclusion of unlisted sources. The list will be reviewed and revised as needed by the Subcommittee. Industries or communities which have prepared MP

⁵ Salt and Nitrate Source Identification Pilot Implementation Study, 2010 Central Valley Salinity Coalition and Larry Walker Associates on the web at <http://cvsalinity.org/index.php/component/content/article/18-events/60-admin>

documents may request to be reviewed ahead of schedule, subject to Subcommittee approval. The Subcommittee will establish the final schedule for review of practices and technologies in each sector, at a pace that is manageable but that reviews BMPs from all significant source before implementation plan development. The Call Dates shown below are set to allow 2-3 months for preparation and review of the MPs before the next is called. As processes are reviewed, the common BMPs will be reviewed for consistent assumptions and completeness. When a practice's effectiveness is obvious based on readily-available information, it may be recommended for approval by the Executive Committee with less rigorous review or scientific study. The Waterboards will assist with the calls for practices via their Lyris List for CV-SALTS and other related groups.

Source	Call Date
1. Pilot Implementation candidates-Significant sources	November 2011
2. Surface Drinking and Irrigation Water	January 2012
3. Groundwater Drinking and Irrigation Water	January 2012
4. Irrigated agriculture/Fertilizer	January 2012
5. Non-point source/stormwater	May 2012
6. Wetlands	May 2012
7. Wastewater/Industrial dischargers	May 2012
8. Food processing industries	October 2012
9. Wastewater/Residential dischargers	October 2012
10. Dairy and CAFO	October 2012
11. Water treatment and softening	January 2013
12. Septic tank discharges	January 2013
13. Other point sources and discharges to land	January 2013
14. Atmospheric deposition and other sources	May 2013

Nominations provided will undergo a preliminary review to be sure the documentation is adequately complete for review. This initial review will include data on use of the practice in field implementation, or recommendation by an industry association, farm advisor, public agency, a disinterested user of the practice in the Central Valley or recommendation from a Subcommittee member. Review of practices is limited to the capacity of the Subcommittee and its resources.

2.2 Conflicts

Because the Subcommittee has an active role in the review and recommendation for approval of MPs, the credibility of the process relies on member's objectivity. Members will disclose any potential conflicts of interest to the Co-Chairs of the Subcommittee who may ask them to recuse themselves from practices where the member has a direct or indirect personal financial interest.

2.3 Committee Test Run

Subcommittee members performed a "test run" of the screening tool and Nomination Form to identify gaps in the tool and to better understand the level of effort that will be required to complete the review. This review took place in summer 2011. Parry Klassen, Linda Dorn and Debbie Webster provided practices to screen from Ag and wastewater treatment industries.

2.4 Committee Pilot Testing

As the Subcommittee continues developing the screening tool and toolbox the Subcommittee may prepare a technical scope of work for pilot implementation of the screening tool on several practices.

This testing will expand on the reviews completed by the committee in the “test run” and help improve the screening tool and “toolbox” as well as help to determine the cost of the review process. The Pilot Test was encouraged to include a broader variety of practices, including physical change projects and outreach or management projects, in order to better explore diverse practices.

2.5 Consultant Scope of Work

After pilot testing, the committee may recommend broader application through a scope of work for larger scale review of practices for the “toolbox”.

3 Practice Types

To simplify review and inclusion in the “toolbox” the MPs have been separated into three types: validated practices, new or developing practices, and indirect or policy practices. All three types of practices may be included in the “toolbox” if they meet the standards provided in section 4.0 as screened in the tool. Each type of practice represents a different stage or expectation for the documentation and analysis. Additionally, practice types may characterize single practices or sets of practices that address salt, nitrate, or both. Additional types of practices, or practice variants, may be developed in the future. Validated practices are intended to be a “high bar” for completely validated practices. Most other practices will fall into the developing category. Developing practices require additional evaluation and monitoring before they can be validated.

3.1 Validated Practices

MPs for which information shown in Attachment 1 (to be developed by the Subcommittee) is available should be submitted under the validated practices category. The standards (described in Section 4) for effectiveness and field implementation should be met by documentation including scientific studies (university research, trade research publications, other technical literature), by monitoring results, or by some other verifiable evidence. These practices will allow the greatest implementation flexibility and lowest monitoring requirements. Attachment 1 will provide the information and evaluation framework and formats for information to be submitted. The result will be a compendium of information concerning the practice or action that makes it amenable to implementation (inclusion in the “toolbox”).

MPs that have been evaluated by other Best Management Practice programs acceptable to the Subcommittee may be submitted in their existing formats provided they contain equivalent information.

3.2 New or Developing Practices

Many MPs to address salt and nitrate are new or documentation is still being developed, demonstrated or validated. The identification of a practice as new or developing should not detract from its perceived effectiveness or value, but only indicates its status of implementation and review. New or developing practices will not have all documentation under the standards section and will not generally have monitoring necessary for full validation. When practices characterized as new or developing it may be anticipated that additional monitoring or information may need to be provided by implementing industries or communities for it to be considered a fully validated practice.

3.3 Indirect or Policy Practices

Another grouping of practices includes practices that are deemed appropriate or necessary, that may not directly impact salt or nitrates in the environment, and for which the only possible quantification of

impact may be a general estimate. For these practices, inclusion in the “toolbox” will be based on industry recommendations or regulatory requirements or where they are a clear adjunct to other practices. Examples of such practices may include public outreach to improve awareness of urban and rural water users, or economic incentives (e.g., rate structures and fees) to reduce salt and nitrate releases. When salt and nitrate load reductions cannot be reliably estimated, cost effectiveness of the practice may be impossible to determine.

4 Standards

Screening of practices requires review of their effectiveness in reducing salt and nitrate in the system. If a practice is demonstrated as superior to general current practices for salt and nitrate management, and meets other (e.g., cost, feasibility) criteria, then it warrants consideration for the “toolbox”. General practice is defined as the unregulated or unimproved baseline. Industries that previously or voluntarily reduced salt or nitrate discharges will not be penalized for such leadership. MPs in this document are defined as beneficial or effective at management of salt and nutrients. The demonstration of Best Practices may be highly situational or impossible to determine before practices are implemented and monitored in several locations. The Subcommittee will further develop screening standards to provide additional detail on standards, as needed. The Screening of nominations uses the following standards. The nominator of the practice shall provide readily available documentation of the practice relative to each are of the Nomination Form (Attachment 3). The standards discussion in this section includes the directions to reviewers in reviewing the evaluating a nomination. The Nomination Form has corresponding instructions for those completing the form.

4.1 Technical Effectiveness – does it work?

Demonstrating technical effectiveness is critical for a MP to be implemented and accepted by industry or communities. Reviewers will look for evidence of technical effectiveness as demonstrated by lab, pilot and evaluated demonstration studies. The documentation should indicate the practice removes, destroys, manages or otherwise reduces negative impacts to beneficial uses from salt and nutrient constituents or otherwise assists with compliance or improvement of the waters of the valley for these constituents.

4.2 Implementability – can it be used broadly?

Implementability includes both feasibility as well as well as broad applicability. In most cases, satisfactory implementability is demonstrated by documentation of the use of the MP by a significant portion of the sector and considers other issues related to cost and efficiency covered in other sections.

4.3 Benefits and Impacts

In evaluating the implmentability of MPs the Subcommittee should consider the benefits and impacts of the MP. Have the benefits and impacts been acceptably quantified? Do the benefits appear to outweigh identified negative impacts of its implementation?

Additionally, the Subcommittee should consider cross-media impacts, such as impacts to air quality, water supply, energy consumption and other water quality constituents. The ideal practices are effective on salt and nutrient constituents and have few or minimal impacts to other areas.

Reviewers should look for MPs that reduce any detrimental effect to other media while achieving the goals of the MP. These should be identified and any impact quantified if possible.

4.4 Cost effectiveness – is it economic to implement today?

Cost effectiveness is critical to being an effective best practice. Low efficiency costly practices are not likely to be broadly implemented. High value practices will likely be implemented with minimal regulatory encouragement. Reviewers assessment of effectiveness related to cost is not always a simple as dollars per ton of salt or pound of nitrate, often costs include a technically trained workforce to implement, operate and maintain the practices. Additionally, this may vary across industry and across regions. The cost effectiveness should strive to take into account all benefits to the entity implementing the practice as well as direct and indirect cost of implementation. In other words not just the technology but the impacts on quality of the product or preparation or disposal of wastes and other potential cross media impacts. These costs should evaluate life cycle benefits and costs of implementations and societal and environmental benefits and costs, when possible.

The ideal practice nomination will provide information on the practices costs on an industry appropriate unit basis such as, per acre, per acre foot, per million gallons, per ton or etc. so it may be compared.

4.5 Monitoring – proving it works?

Reviewers should evaluate both the ability to monitor as well as the length and breadth of the monitoring history as a part of screening. Monitoring during the implementation stage may be greater in developing practices than fully validated practices that have already identified critical monitoring parameters for implementation and operations.

4.6 Other Regulatory or Non-Regulatory Approvals

CV-SALTS, as an option, may be able to utilize prior validation work performed by Regional Water Quality Control Boards (Regional Water Board) and State Water Resources Control Board (State Water Board) collectively Waterboards, Department of Public Health, building codes or other accreditation groups for validation. Where appropriate this should be done to reduce the cost and delays associated with duplication of validation. Cost effectiveness of the MP should still be evaluated.

Additionally, in cases where a practice is obvious, broadly implemented and effective it may be recommended with less rigorous review or scientific study for approval by the Executive Committee.

5 Management Practice Toolbox

The Subcommittee will establish and update a list of MPs for each sector in the form of a “toolbox”. The “toolbox” will change as more information is reviewed and may also be used to track MPs, alternatives and technologies. The list will be maintained by the Subcommittee and Central Valley Salinity Coalition (CVSC). The “toolbox” will be available on the cvsalinity.org website and facilitate tracking the status of evaluation, verification, and monitoring. The Preliminary list of practices is shown as Attachment 2; this list will be updated or replaced as the “toolbox” is developed by the Subcommittee.

6 CV-SALTS Management Practice or Technology Presentations

MPs and Technologies that warrant recommendation for approval by the CV-SALTS Technical Committee and Executive Committee will have been reviewed according to the processes described previously. Recommended items will have been found to merit wider application to CV-SALTS stakeholders. Technologies warranting recommendation should have been monitored during several pilot deployments to demonstrate effectiveness. Exceptions may be granted by the Subcommittee for practices that show special promise or at the request of the Executive Committee. Executive or Technical Committee members may recommend practices for Subcommittee consideration at the next regularly scheduled meeting.

Vendors or technology proponents who wish to have specific practices evaluated for inclusion in the “toolbox” should contact the Central Valley Salinity Coalition or the Subcommittee Chair. Nominations provided will undergo a preliminary review to be sure the documentation is adequately complete for review. This initial review will include data on use of the practice in field implementation, or recommendation by an industry association, farm advisor, public agency, a disinterested user of the practice in the Central Valley or recommendation from a Subcommittee member. Review of practices is limited to the capacity of the Subcommittee and its resources.

DRAFT

Attachment 1

This attachment provides information on the review of MPs for inclusion in the CV-SALTS “toolbox” for reductions in salt and nitrate that are significant to the Central Valley.

Screening Process

The Subcommittee will use the evaluation framework process in Section 2 and standards in Section 4 to review MP documentation submitted on the Nomination Form in Attachment 3 or alternatively provided as industry collections of MPs.

1. Industry nomination or source or sector call for nominations request
2. Formatting for screening by nominator or tech support using the Nomination Form or alternate format acceptable to the Subcommittee.
3. Initial review for completeness and appropriateness for review
4. Assessment of submitted data by Subcommittee and additional info/expert review, if needed
5. MP Subcommittee and Technical Committee recommend practices
6. Executive Committee Approves and Toolbox is updated
7. Practice Implementation, Operations and Maintenance, Monitoring, Reporting
8. Revision, if needed and review

This is also shown in Figure 1 in Section 2.

The Subcommittee developed the Nomination Form with brief instructions for users shown in Attachment 3 to ensure nominated practices meet the standards presented in section 4.0.

Attachment 2

A preliminary list of potential MPs to manage salt and nitrate as suggested by the subcommittee is listed below for development of the scope of the Pilot Testing of the screening process: **THIS LIST IS TO BE REVISED BY THE SUBCOMMITTEE IN THE 11/21/11 MEETING WITH THE TECHNICAL PROJECT MANAGER.**

1. Nitrogen/Nutrient Management by well testing for leaching of nutrients to groundwater
2. Soil testing for accurate nutrient fertilization (Ag)
3. Selected Sustainable Growing Practices, (Almond Board) – Parry or others
4. Selected Dairy Practices - Dairy CARES/ JP or Paul
5. Nitrate removal from drinking water by fluidized bed reactor technology (TBD)
6. Selective pumping of well water without TDS via insitu membrane filtration/RO (TBD)
7. KOCl substitution for NaOCl use in cleaning and processes (Tom - Enviro Tech)
- 8.
- 9.
- 10.

Potential Practices (listed to promote discussion only, not as nominations to prioritize)

1. Irrigation efficiency/reduce irrigation – Reduce salts imported with water or from groundwater
2. Tailwater reuse/drainage recirculation – reduced discharged of salt
3. Growing salt tolerant crops – reduced imported water while maintaining production
4. Evaporation ponds, solar evaporators – isolates the salt to allow management
5. Salt separation and utilization – fractionate and create products for reuse or sale
6. Drain water and brackish water desalination- Isolates salt for management
7. Detergent reformulation - source control
8. Industrial biomass and brine management – isolates salts and potentially reuses salts
9. Reduce imported feed for CAFO's – reduces salt import from feed sources
10. Reduce seepage from brine conveyance - reduces dissolution of salt from soils
11. Industrial salt source reduction/reuse – reduces salts for production
12. Increase export of salt containing products - exports salt unless salt is imported for products
13. Increase salt export in surface waters leaving the region
14. Increase outdoor landscape irrigation efficiency – reduces imported water/groundwater use
15. Increase indoor water use efficiency – reduces imported water and groundwater use
16. Reduce water softening need or shift to ocean disposal of brine – reduces residential salt source
17. Local salt collection and disposal – Disposal and removal from basins
18. Increase salt discharge at EBMUD – ocean discharge and removal from basins
19. Salt collection and treatment (ocean qualified brine) for ocean discharge and removal
20. Deep well injection for storage and recovery of salts – Removal of salt from basins, with recovery when economic

Attachment 3

MP Screening Nomination Form is located at:

http://cvsalinity.org/index.php/procurement/doc_download/728-bmp-screening-nomination-form-v3

and appears on the following pages in PDF format.

Draft

CV-SALTS Management Practice Nomination Form

This Nomination Form includes limited instructions for the completion of the form. Initial reviewer instructions are included the Subcommittee Screening Document and will be further developed in future work. The nominator of the practice will provide all available information for the practice and may include estimated information to be verified if noted in the text. Should additional information be required to complete the review it will be requested.

*In the pilot phase additional standardization of requested information on the management practices will likely be developed. Additionally review of the practice implementation and effect on overall salinity and nitrate management in the Central Valley may be further assessed at a future date. Submittal of management practices for inclusion into the toolbox should answer the following questions with the best information available to the submitter. **Please annotate responses with references and source documents, list these under Question 7.***

A. Is this nomination for a plan or programmatic activity as opposed to a field implementation practice or technology? YES NO

if yes, complete the following sections as appropriate, if no proceed to question 1.

- 1. Title – Please provide a short descriptive title for the practice**
- 2. Description – Please provide a short (1-2 paragraphs) description of the practice/technologies to summarize the practice, industries and important information**
- 3. Constituent Salts or Nutrients Managed –** Identify the primary and secondary constituents (EC TDS, Nitrates other nutrients etc) that are treated, reduced or managed by this practice and how they are reduced or managed.
- 4. Applicability –** Describe the documented application of this practice, where how and how extensively the practice has been implemented what conditions or circumstances limit the application of this practice. Industry specific application and limitations may be developed and show as Attachment A. Such limitations may include industry, region, soil type, media or other limits.

5. **Practice Benefits and Impacts** – Describe the documented benefits of implementing the practice (what does it do) including any negative impacts of implementation (including cross media/air/energy/supply etc)

6. **Effectiveness Documentation** – 6 a. Describe the documented effectiveness of implementing the practice on the target constituents. Whenever possible quantify the effectiveness of the practice as completely as possible. 6 b. Summarize and critical factors or limitations to effectiveness. If documentation of a cost benefit study please reference it below in 7.

7. **Supporting studies, Research and Source Documents** – List all documents referenced in responses above or other documents that provide information evidence or background on the technology or practice and electronic availability.

8. **Implementation**
 - 8.1 **Costs** - Summarize and document costs for implementation of this practice both Capital and Annual operations and maintenance costs. If possible, express in industry relevant units of \$/acre foot or \$/million gallons, \$/ton or etc. to allow comparison with other practices.

 - 8.2 **Status and Potential** – Describe the Historic and current level of implementation, at the level know. List any information known on the potential full implementation of this practice

 - 8.3 **Monitoring Documentation** – Describe the level of monitoring and documentation available to support the practice. If known, what additional monitoring is needed? If known what level of monitoring will be needed at implementation.

9. **Other Regulatory Approvals or Requirements** – Has this practice been approved or required by any other government agency or independent standard setting body, if so summarize this and any information you may have on the process and status of approvals. Indicate what level of review if required for that regulatory requirement or guidance?

Standards and information repeated for the Nominator from the Subcommittee screening document.

4 Standards

Screening of practices to include in the toolbox requires the review of practices for effectiveness in reducing salt and nitrate in the system. The Screening tool uses the following standards as documented by the proposer of the practice for screening.

4.1 Technical Effectiveness – does it work?

Demonstrating technical effectiveness is critical for a management practice to be implemented and accepted by industry or communities. Evidence of technical effectiveness is demonstrated by lab, pilot and demonstration studies and evaluation of the studies. Does the documentation indicate strongly that the practice removes, destroys, manages or otherwise reduce any negative impacts to beneficial uses associated with its presence and assist with compliance or improvement of the waters of the valley.

4.2 Implementability – can it be used broadly?

Implementability includes both feasibility as well as broad applicability. In most cases, satisfactory implementability is demonstrated by documentation of the use of the management practice by a significant portion of the sector and considers other issues related to cost and efficiency covered in other sections. Implementability of management practices may consider cross-media impacts, and look for management practices that reduce any detrimental effect to other media while achieving the goals of the management practice. These should be identified and any impact quantified if possible.

4.3 Cost effectiveness – is it economic to implement today?

Cost effectiveness is critical to being an effective best practice. Low efficiency costly practices are not likely to be broadly implemented. High value practices will likely be implemented with minimal regulatory requirements. The assessment of effectiveness related to cost is not always as simple as dollars per ton of salt or pound of nitrate, often costs include a technically trained workforce to implement, operate and maintain the practices. Additionally, this may vary across industry and across regions. The cost effectiveness should strive to take into account all benefits to the entity implementing the practice as well as direct and indirect cost of implementation. In other words not just the technology but the impacts on quality of the product or preparation or disposal of wastes and other potential cross media impacts. These costs should evaluate life cycle benefits and costs of implementations and societal and environmental benefits and costs, when possible.

4.4 Monitoring – proving it works?

Both the ability to monitor as well as the length and breadth of the monitoring history will be reviewed as a part of screening. Monitoring during the implementation stage may be greater in developing practices than fully validated practices that have already completed it.

Nomination Form Attachment 1

Applicability checklist by Industry, Processes or Region

The following industries, processes and regions may have specific screening requirements that the Subcommittee will develop in the future.

Industry or Process	8. San Joaquin	9. East Valley	10. West Valley	11. Tulare Lake	12. Sacramento	13. Lake/Foothills
1. Agriculture						
2. Food Processing						
3. Manufacturing						
4. Wine Industry						
5. WWTP						
6. Water Supply Management						
7. Water Treatment						
14. OTHERS						