



2011 Innovations Awards Application

DEADLINE: MARCH 28, 2011

ID # (assigned by CSG): 2011- _____

Please provide the following information, adding space as necessary:

State: Oklahoma

Assign Program Category (applicant): Natural Resources/ Water Resources

1. Program Name OWRB Stream Water Allocation Modeling
2. Administering Agency Oklahoma Water Resources Board
3. Contact Person Robert S. Fabian
 (Name and Title) Section Head Planning and Management Division
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9. Please provide a two-sentence description of the program

This program is a comprehensive water planning tool for the adjudication and effective management of water rights in Oklahoma. It aims to assess the water availability and reliability of supply for current permit holders and new permit applications, and provides further information on supply-demand gaps, areas of potential interference of water rights, flow at ungauged locations after appropriation and impacts of climate change in the state.

10. How long has this program been operational (month and year)? Note: the program must be between 9 months and 5 years old on March 28, 2011 to be considered.

The program has been operating since 2007

11. *Why was the program created? What problem[s] or issue[s] was it designed to address?*

In Oklahoma, stream water is considered to be publicly owned and subject to appropriation by the OWRB. Current Oklahoma water law and OWRB regulations require that a permit application be filed prior to the diversion of water. The permit would be senior to permits issued on the stream at a later time, which is referred to as the Doctrine of Prior Appropriation (first in time, first in right) that is used by many states in the west to allocate and administer water rights.

Approval of a permit application by the Water Board must satisfy four conditions: **1)** A present or future need for the water must exist and the intended use must be beneficial; **2)** the applied for amount of unappropriated water must be available; **3)** the use of water must not interfere with domestic or existing appropriative uses, and **4)** the use must not interfere with existing or proposed beneficial uses within the stream system and the needs of the area's water users if the application is for the transportation of water for use outside the area where the water originates.

The program was created to address the need for a more accurate determination of the latter three conditions mentioned above. Previous methods to assess water availability at ungauged locations were approximate, and interference of water rights was complex and difficult to estimate. The OWRB surface water allocation program uses data from 1950 to present, providing estimates of water availability after appropriation at any location of a basin, showing areas of potential interference and shortages, and taking into consideration inter- and intra-basin transfers.

12. *Describe the specific activities and operations of the program in chronological order*

2007: OWRB Contracted with AMEC to develop the first allocation model as part of the Oklahoma Comprehensive Water Plan.

2008: OWRB requested customization of the software and construction.

2009-Present: OWRB has been developing allocation models, and is currently working on a model for the Middle and Lower Canadian River basins.

13. *Why is the program a new and creative approach or method?*

- The program is a comprehensive approach developed for the entire state of Oklahoma.
- Water use reports submitted annually by the permit holders are included as input for the allocation models.
- The customized software provides four priority and non-priority based scenarios, allowing proper calibration of the models, and other types of analysis that include changes in demand patterns, return flows, and surface runoff. It also accounts for inter- and intra-basin water transfers, interstate stream Compacts, and in-stream flows.
- Further analysis of simulation results can be accomplished using Microsoft Excel and ArcGIS for the creation of interactive maps, graphs, and tables. This allows the OWRB Permitting Section to evaluate if junior water rights need to be cut off during drought years in order to allow water for senior rights.
- The OWRB has created an innovative tool for the Permitting Section to evaluate new permit applications. The tool allows staff to enter the information from a new permit application and quickly retrieve graphs and tables about the reliability of the flows at the proposed location, and the frequency of shortages that the applicant might face if the permit is approved.
- The program has been extended to evaluate the supply-demand gaps and estimate the potential impacts of climate change in the state, as part of the Oklahoma Comprehensive Water Plan.

14. *What were the program's start-up costs? (Provide details about specific purchases for this program, staffing needs and other financial expenditures, as well as existing materials, technology and staff already in place.)*

Initial costs were approximately \$75,000 for consultants to complete the first allocation model for the Blue River and Clear Boggy Creek. This amount also included training for staff and modeling software. Model operates within Microsoft Excel software.

15. *What are the program's annual operational costs?*

The annual costs of the program are approximately \$50,000.

16. *How is the program funded?*

The program is funded through state appropriations.

17. *Did this program require the passage of legislation, executive order or regulations? If YES, please indicate the citation number.*

No legislative or regulatory changes were required.

18. *What equipment, technology and software are used to operate and administer this program?*

The allocation models are constructed using a network-flow algorithm in Microsoft Excel® called Central Resource Allocation Model (CRAM). Results can be further analyzed using Microsoft Excel and ArcGIS.

19. *To the best of your knowledge, did this program originate in your state? If YES, please indicate the innovator's name, present address, telephone number and e-mail address.*

Yes, the program originated in the state of Oklahoma as part of the Oklahoma Comprehensive Water Plan.

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20. *Are you aware of similar programs in other states? If YES, which ones and how does this program differ?*

The OWRB is aware of the use of stream water allocation models in other states for water administration purposes at the local scale. However, this program is intended to cover the entire state of Oklahoma, and allows the agency to manage current water rights, evaluate new permit applications, determine water availability at any ungauged point of the basins, and account for climate change conditions.

21. *Has the program been fully implemented? If NO, what actions remain to be taken?*

The program is still being developed. Stream water allocation models exist for eight (8) basins in Oklahoma. We anticipate that the program will be fully implemented in five (5) years.

22. *Briefly evaluate (pro and con) the program's effectiveness in addressing the defined problem[s] or issue[s]. Provide tangible examples*

Pro:

- The program has served to evaluate the supply-demand gaps in south-east Oklahoma and the potential impacts of climate change for the *Oklahoma Comprehensive Water Plan*

- The program is comprised of a set of scientifically-defensible and easy to use tools that allow the agency to better manage the water resources of the state.

Con:

- Time and cost constraints may limit the completion and updates of the models for the entire state.
- The program requires an extensive analysis of stream flow and water use records.

23. How has the program grown and/or changed since its inception?

The program has continued to grow since its inception, as it started as a tool for evaluating current water rights. However, the flexibility of the software and the increasing need for more efficient analysis tools have allowed the OWRB to add capabilities to the program. As part of the *Oklahoma Comprehensive Water Plan*, the program is now able to support the evaluation of the demand-supply gaps, and the potential impacts of climate change in the state. Additional features have been developed for the evaluation of new permit applications, administration of current water rights, assessment of water availability and reliability, identification of areas with frequent shortages and/or interference of water rights, and the providing of scientifically defensible information to the public.

24. What limitations or obstacles might other states expect to encounter if they attempt to adopt this program?

- There are limited training opportunities to learn how to build a model using ExcelCRAM®.
- It takes time and effort to construct and calibrate the models.
- There are on-going costs of maintaining and updating the models.
- Use of the models in the stream water permitting process requires a more technically sophisticated staff.

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