

AGENDA

SOUTHERN NEVADA WATER AUTHORITY BOARD OF DIRECTORS

REGULAR MEETING
9:05 A.M. – NOVEMBER 15, 2012

BOARD CHAMBERS, SOUTHERN NEVADA WATER AUTHORITY
100 CITY PARKWAY, SEVENTH FLOOR, LAS VEGAS, NEVADA
(702) 258-3100

Board of Directors

Shari Buck, Chair
Mary Beth Scow, Vice Chair
Sam Bateman
Bob Coffin
Tom Collins
Duncan McCoy
Steve Sisolak

Patricia Mulroy,
General Manager



SOUTHERN NEVADA
WATER AUTHORITY

The Southern Nevada Water Authority makes reasonable efforts to assist and accommodate persons with physical disabilities who desire to attend the meeting. For assistance, call Katie Horn at (702) 870-2011 at least 24 hours prior to the meeting.

THIS MEETING HAS BEEN PROPERLY NOTICED AND POSTED IN THE FOLLOWING LOCATIONS:

City of Boulder City, City Hall
401 California Street
Boulder City, Nevada

City of Henderson, City Hall
240 Water Street
Henderson, Nevada

City of North Las Vegas, City Hall
2250 Las Vegas Boulevard North
North Las Vegas, Nevada

City of Las Vegas, City Hall
495 South Main Street
Las Vegas, Nevada

Clark County Government Center
500 S. Grand Central Parkway
Las Vegas, Nevada

Clark County Water Reclamation District
5857 E. Flamingo Road
Las Vegas, Nevada

Southern Nevada Water Authority
100 City Parkway, Suite 700
Las Vegas, Nevada

Las Vegas Valley Water District
1001 S. Valley View Boulevard
Las Vegas, Nevada

All items on the agenda are for action by the Board of Directors, unless otherwise indicated. Items may be taken out of order. The board may combine two or more agenda items for consideration, and the board may remove an item from the agenda or delay discussions relating to an agenda item at any time.

CALL TO ORDER

COMMENTS BY THE GENERAL PUBLIC

NO ACTION MAY BE TAKEN: This is a period devoted to comments by the general public pertaining to items on this agenda. If you wish to speak to the Board about items within its jurisdiction, but not appearing on this agenda, you must wait until the "Comments by the General Public" period listed at the end of this agenda. Please limit your comments to three minutes or less and refrain from making comments that are repetitious, offensive, or amounting to personal attacks. No action may be taken upon a matter not listed on the posted agenda.

ITEM NO.

1. *For Possible Action:* Approve agenda with the inclusion of tabled and/or reconsidered items, emergency items and/or deletion of items, and approve the minutes of the regular meeting of October 18, 2012.

CONSENT AGENDA Items 2-5 are routine and can be taken in one motion unless a Director requests that an item be taken separately.

2. *For Possible Action:* Accept all construction work required to be performed under Contract No. 090G 25 C6, Equip Northern Resources Irrigation Wells.
3. *For Possible Action:* Approve an intergovernmental agreement, in substantially the same form, between Denver Water and the Authority for a joint study on nitrosamine formation within a water treatment system, and accept funds for this research work.
4. *For Possible Action:* Approve an interlocal agreement among the City of Henderson, the City of Las Vegas, Clark County, the Regional Transportation Commission of Southern Nevada, the Clark County Water Reclamation District, and the Authority to establish funding allocations for the Clark County Aerial Imagery Project for a period of three years from January 1, 2013.

5. *For Possible Action:* Approve Amendment No. 1 to the existing agreement between Sanborn Map Company, Inc., and the Authority for digital aerial imagery services authorizing an increase in compensation for the period from January 1, 2013, through December 31, 2015.

BUSINESS AGENDA

6. *For Possible Action:* Adopt the 2012 Water Budget for the Authority.
7. *For Possible Action:* Adopt the Southern Nevada Water System Operating Plan.
8. *For Possible Action:* Adopt the 2013 Revenue Refunding Bond Resolution, authorizing the issuance of the Southern Nevada Water Authority Revenue Refunding Bonds, Series 2013; providing that the Bonds may be evidenced by a single registered bond; fixing the terms and conditions thereof and covenants relating to the payment of the Bonds; and securing their payment by a pledge of revenues derived from the Southern Nevada Water Authority.
9. *For Information Only:* Receive an update from staff on water resources including, but not limited to, drought conditions in the Colorado River Basin, the results of the implementation of the Authority's Water Resource and Conservation Plans, activities on the Colorado River, the development of in-state water resources, and the status of the third intake project.

COMMENTS BY THE GENERAL PUBLIC

NO ACTION MAY BE TAKEN: At this time, the Board of Directors will hear general comments from the public on matters under the jurisdiction of the Southern Nevada Water Authority. Please limit your comments to three minutes or less and refrain from making comments that are repetitious, offensive, or amounting to personal attacks. No action may be taken upon a matter not listed on the posted agenda.

Visit our website at www.snwa.com/apps/agenda/snwa/index.cfm
for Southern Nevada Water Authority Agenda Postings and Approved Minutes

**SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
REGULAR MEETING
OCTOBER 18, 2012
MINUTES**

CALL TO ORDER 9:01 a.m., SNWA Board Chambers, Southern Nevada Water Authority
100 City Parkway, Seventh Floor, Las Vegas, Nevada

BOARD MEMBERS PRESENT Shari Buck, Chair
Mary Beth Scow, Vice Chair
Sam Bateman
Bob Coffin
Tom Collins
Duncan McCoy
Steve Sisolak

BOARD MEMBERS ABSENT None

STAFF PRESENT Pat Mulroy, Greg Walch, Phil Speight, Ron Zegers, Zane Marshall, Marc
Jensen

OTHERS PRESENT Marc McGuinness, Marsh Risk and Insurance Services

Unless otherwise indicated, all members present voted in the affirmative.

COMMENTS BY THE GENERAL PUBLIC

None

1. Approval of Agenda & Minutes

FINAL ACTION: A motion was made by Director Collins to approve the agenda for this meeting and the minutes of the regular meeting of September 20, 2012. The motion was approved.

2. Approve a cooperative agreement between the State of Nevada, Division of Forestry, and the Authority to conduct inmate conservation work detail services for the period from October 31, 2012, through October 31, 2014, for an amount not to exceed \$200,000, and authorize the General Manager to approve future amendments to the agreement to extend the period of performance for an additional two years at the current contracted daily rate.

FINAL ACTION: A motion was made by Director Collins to follow staff's recommendation. The motion was approved.

3. Approve and authorize the General Manager, or designee, to sign a right-of-way grant offered by the Bureau of Land Management for the construction, maintenance, and termination of an existing access road across federal land to the Phillips Ranch in Spring Valley, Nevada, and to pay 30 years of rental fees for the road to the federal government in the amount of \$1,651.10.

FINAL ACTION: A motion was made by Director Collins to follow staff's recommendation. The motion was approved.

4. Approve an agreement, in substantially the same form, retaining Marsh Risk and Insurance Services, the Authority's current insurance broker, and approve an extension of the Builders Risk Insurance and Terrorism Insurance on the Lake Mead Intake No. 3 Project.

Director Collins noted Marsh Risk and Insurance Services' excellent reputation as an insurance provider, and asked for an update on the intake's insurance policy. Ms. Mulroy reported that Marsh is only one of eight insurance companies insurance that offer insurance on tunnel projects of the intake's magnitude. Director Sisolak asked if there was a pending claim with Marsh due to the tunnel's inflow events. Ms. Mulroy confirmed that the SNWA is currently in arbitration.

Director Coffin asked about the policy's terms. Mark McGuinness, managing director of Marsh and McLennan, provided the board with information regarding the Authority's Builder Risk Insurance. He noted there is \$580 million worth of builder's risk insurance for the intake project, which includes the tunnel and tunnel boring machine. He noted the project's complexities, and listed those companies that are on the risk currently: Munich RE, the leading insurer who sets the terms, Star Underwriting, Great Lakes Reinsurance, SCOR Reinsurance, HDI Gerling, and Zurich. Mr. McGuinness went on to note that these insurance companies are all syndicates of Lloyds, and fully-insured, A-rated and leaders in their field. These companies are obliged to stay on the risk through the completion of the project, regardless of delays. Following the inflow events, the insurance companies required some reassurance that the project was continuing without problems and that the Authority and its contractors was adhering to the "tunneling code of conduct." The insurance companies were pleased with the tunnel's progress.

Director Coffin asked if the insurance companies have asked for a retrospective re-rating of the policy. Mr. McGuinness indicated the insurance companies did not require a re-rating, and noted it is a guaranteed cost.

Director Sisolak asked if this money was available within the bond proceeds; Ms. Mulroy confirmed it was.

FINAL ACTION: A motion was made by Director Collins to follow staff's recommendation. The motion was approved.

5. Receive a report on the Water Resource Plan and, if appropriate, adopt the current plan for another year.

FINAL ACTION: A motion was made by Director Collins to follow staff's recommendation. The motion was approved.

6. Receive an update from staff on water resources including, but not limited to, drought conditions in the Colorado River Basin, the results of the implementation of the Authority's Water Resource and Conservation Plans, activities on the Colorado River, the development of in-state water resources, and the status of the third intake project.

Zane Marshall, SNWA Environmental Resources director, provided the Board with an update of drought conditions and local water use information. A copy of his presentation is included with these minutes. Director Sisolak asked Ms. Mulroy to explain how the lake is impacted by rain events. Ms. Mulroy replied, stating that when the Las Vegas Valley experiences an inch of rain, Lake Mead is also increased by approximately one inch. Director Sisolak asked that the Authority promote the influence of rain events on Lake Mead elevations in its outreach efforts.

Director Coffin discussed his recent visit at the Authority's Northern Resource Properties, and noted that he was impressed with the conditions of the properties and its resources, as well as the Authority's business approach to the properties' maintenance and management.

Marc Jensen, SNWA Engineering director, provided the Board with an update on the status of Intake No. 3. A copy of his presentation is included with these minutes.

NO ACTION REQUIRED

Public Comment

Ed Uehling, Las Vegas, disagreed with the General Manager's response regarding Lake Mead impacts from rain events, and discussed the Authority's methods used to report information. He also asked to access the Authority's agenda backup online.

Mary Joy Alderman asked for information related to the Authority's Integrated Resource Planning Advisory Committee.

Adjournment

There being no further business to come before the board, the meeting adjourned at 9:32 a.m.

APPROVED:

Shari Buck, Chair

Patricia Mulroy, General Manager

Update on Drought Conditions and Water Use

October 18, 2012

Drought Monitor

Released Thursday, October 11, 2012
Author: Matthew Rosecrance, NOAA-NWS-CEP-CDC

Seasonal Drought Outlook

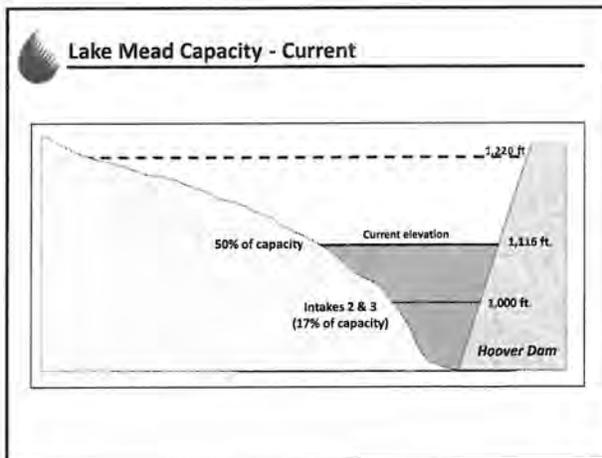
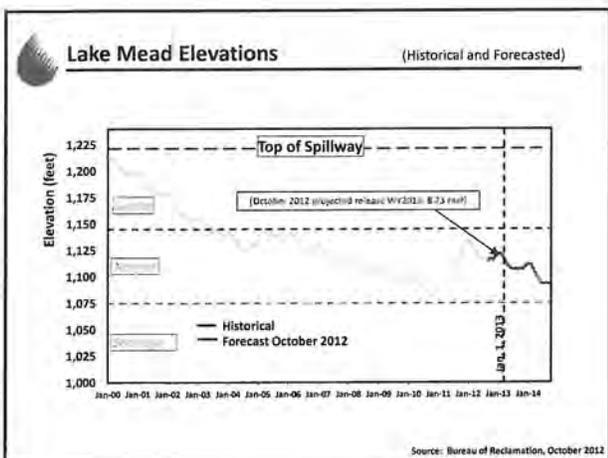
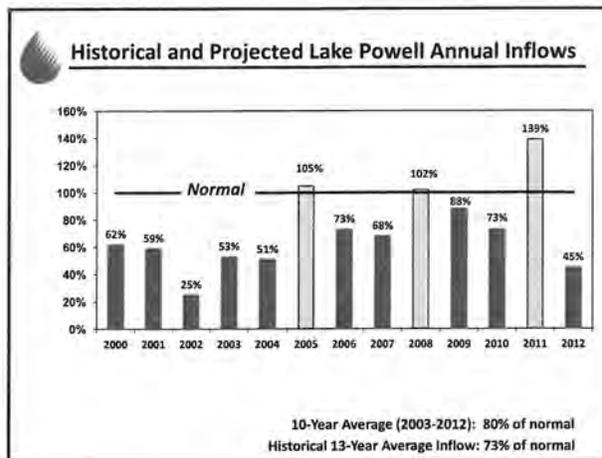
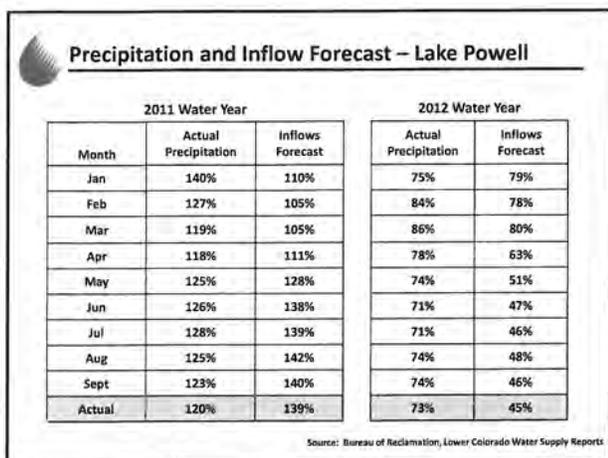
(Valid October - December 2012)

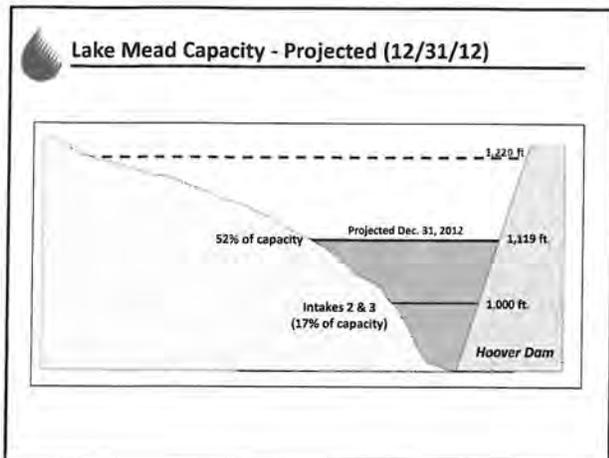
Source: National Oceanic Atmospheric Administration and the U.S. Department of Commerce

Colorado River Basin Conditions

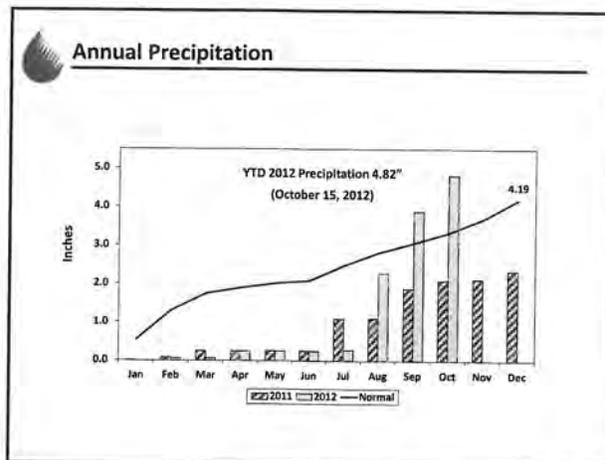
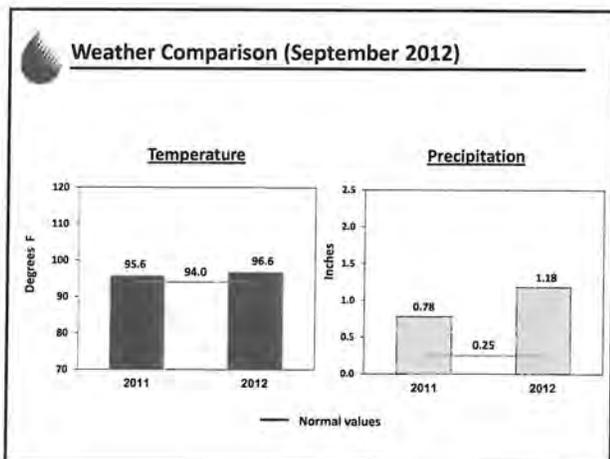
Seasonal Precipitation: October 2011 - September 2012

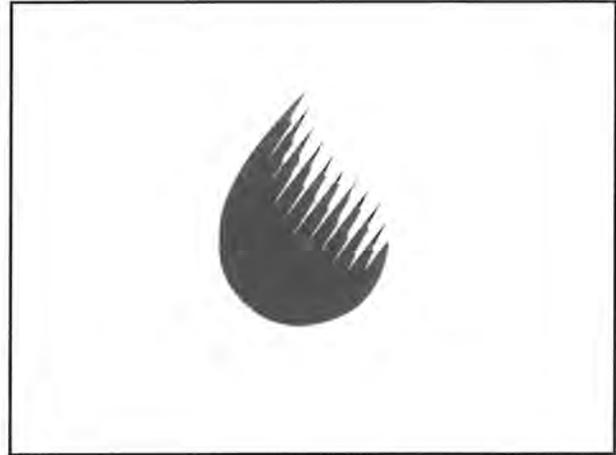
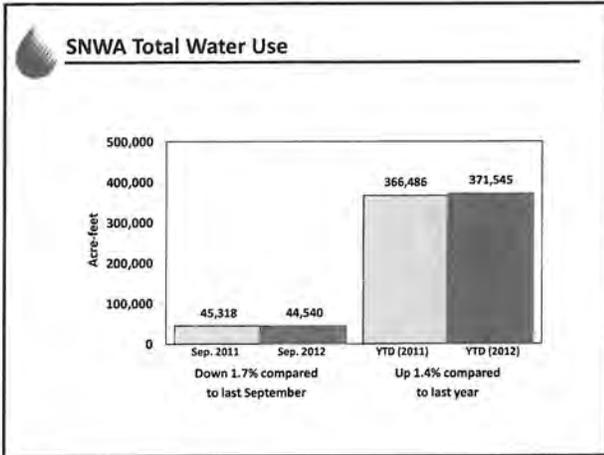
- September inflow to Lake Powell: 25% of average
- Water Year 2012 Precipitation: 73% of average
- Water Year 2012 Inflow to Lake Powell: 45% of average





SNWA Water Use





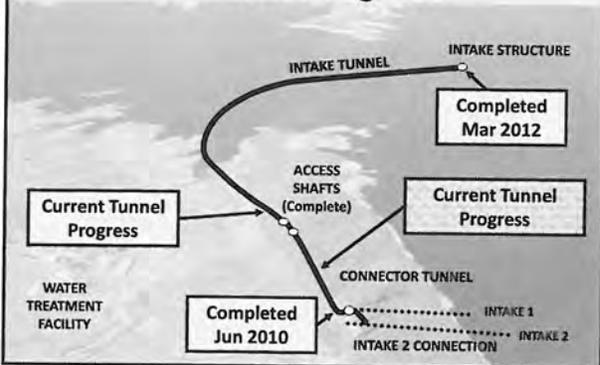


**LAKE MEAD
INTAKE NO. 3**

SNWA Board of Directors
Progress Report

18 October 2012

**Lake Mead Intake No. 3
Current Progress**



**Pre-Cast Concrete Segments
Complete**



**Intake Structure Fabrication and
Installation Complete**



TBM Starter Tunnel Complete



TBM Support Equipment Complete

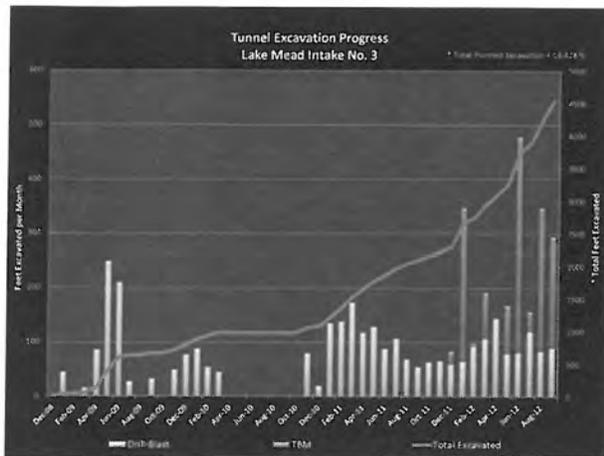


Tunnel Boring Machine
Excavated 1,400 feet



Drilling to Grout Ahead of the TBM





SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
November 15, 2012

Subject: Acceptance of Construction Work	Director's Backup
Petitioner: Ronald E. Zegers, Deputy General Manager, Engineering/Operations	
Recommendations: That the Board of Directors accept all construction work required to be performed under Contract No. 090G 25 C6, Equip Northern Resources Irrigation Wells.	

Fiscal Impact:

The previous commitment from the New Expansion Bond Fund in the amount of \$1,213,000 will be reduced to \$1,089,454.98 if the above recommendation is approved.

Background:

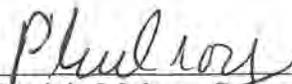
On February 29, 2012, the Board of Directors awarded Contract No. 090G 25 C6 to Mesquite General Contracting, Inc., in the amount of \$1,103,000 for the equipping of five existing wells with line shaft vertical turbine pumps, motors, motor starters, and associated equipment in Spring Valley (Hydrographic Basin No. 184), White Pine County, Nevada, located as generally shown on Attachment A. The Board further authorized a change order contingency in the amount of \$110,000 to be utilized by the General Manager in accordance with Resolution No. 96-003.

The General Manager approved one change order for a decrease in the amount of \$13,545.02, and extended the contract time 27 calendar days.

All construction work required to be performed under Contract No.090 G 25 C6, as modified by one change order, was satisfactorily completed on August 28, 2012, for the final construction cost of \$1,089,454.98.

This action is authorized pursuant to Sections 5(f), 6(d) and 6(j) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this agenda item.

Respectfully submitted:



Patricia Mulroy, General Manager
PM:REZ:MRJ:DCB:smw X0417
Attachment

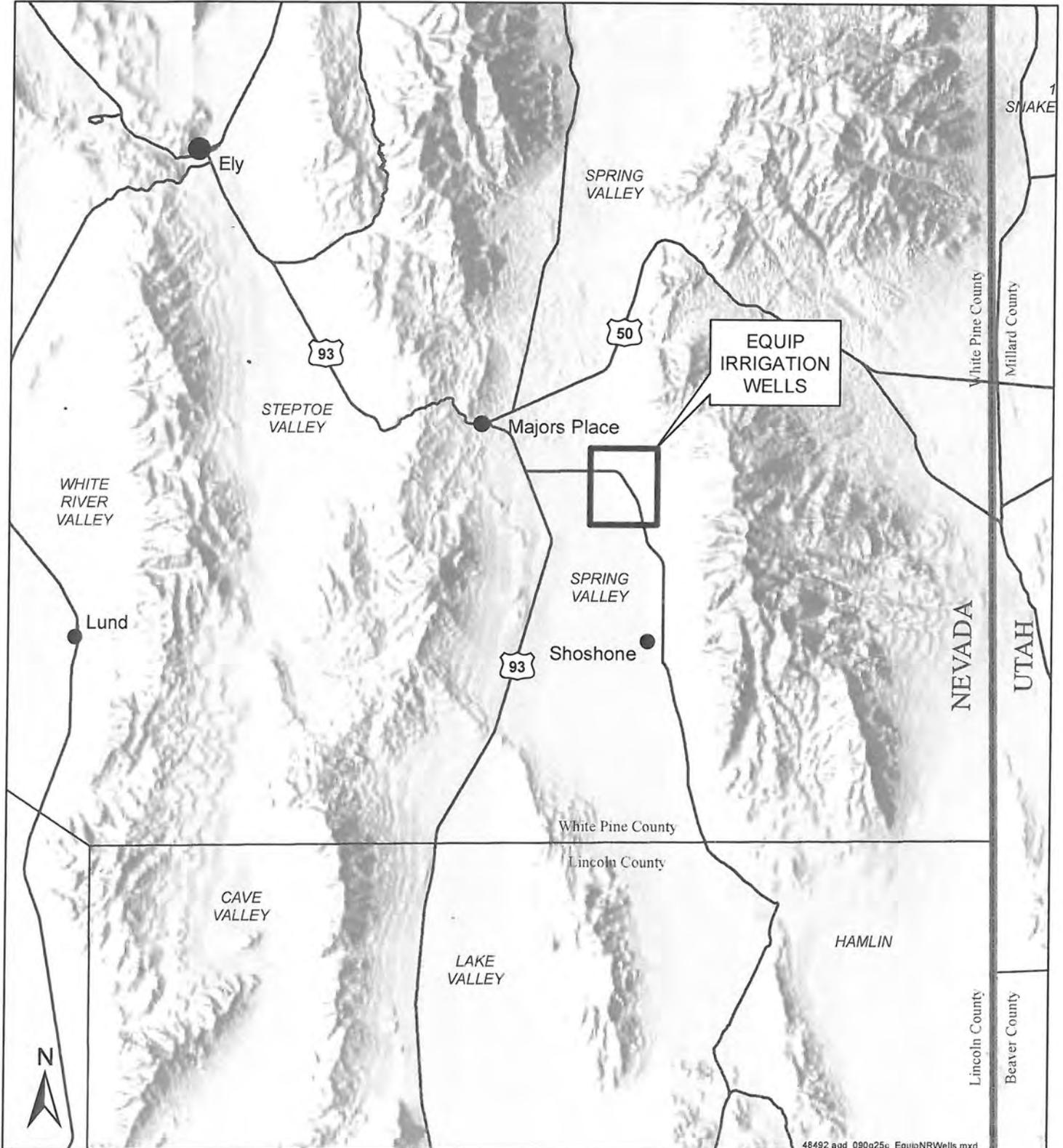
AGENDA
ITEM #

2

BOARD OF DIRECTORS
AGENDA ITEM

CONTRACT NO. 090G 25 C6

EQUIP NORTHERN RESOURCES
IRRIGATION WELLS



48492 agd_090g25c_EquipNRWells.mxd

**SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS**

AGENDA ITEM

November 15, 2012

Subject: Agreement	Director's Backup
Petitioner: Ronald E. Zegers, Deputy General Manager, Engineering/Operations	
Recommendations: That the Board of Directors approve an intergovernmental agreement, in substantially the same form, between Denver Water and the Authority for a joint study on nitrosamine formation within a water treatment system, and accept funds in the amount of \$50,000 for this research work.	

Fiscal Impact:

None by approval of the above recommendation.

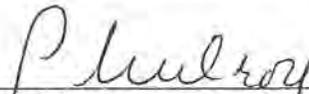
Background:

Some nitrosamines, such as nitrosodimethylamine, are listed as priority pollutants by the U.S. Environmental Protection Agency and may be regulated in the future. The Authority's Water Quality Research and Development (R&D) Division has comprehensive expertise in the study of nitrosamines in drinking water systems. Recognizing this potential issue, Denver Water has requested that the Authority's Water Quality R&D Division participate in a project to identify sources and conditions of significant nitrosamine formation within their water treatment system to address potential control strategies for its full-scale operations.

If approved, the agreement provides that the Authority receive \$50,000 from Denver Water to conduct work under the proposal entitled "Comprehensive Occurrence Study of Nitrosamines at Denver Water." This study is both an opportunity to resolve the occurrence of nitrosamine formation at Denver Water as well as an opportunity to provide insight for other utilities experiencing similar issues and/or with similar treatment schemes.

This agreement is being entered into pursuant to Section 6(j) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this agreement.

Respectfully submitted:


Patricia Mulroy, General Manager
PM:REZ:DJR:ED:jf
Attachment

AGENDA ITEM #

3

CONTRACT NO. 14581A

CONTRACT DATE _____
To be completed by Contract Control

INTERGOVERNMENTAL AGREEMENT FOR A JOINT STUDY ON NITROSAMINES

This Agreement is entered into between the City and County of Denver, acting by and through its BOARD OF WATER COMMISSIONERS (“Denver Water”) and Southern Nevada Water Authority (“SNWA”) to participate in a study regarding occurrence of nitrosamines. Collectively, the parties shall be called the “Parties.”

WHEREAS, the Denver Water and SNWA desire to participate in a study to identify sources and conditions of nitrosamine formation in Denver Water’s treatment system to be able to address potential control methods; and

WHEREAS, SNWA has a research and development team equipped with the appropriate instrumentation, skill set and expertise to analyze the information; and

WHEREAS, the proposed study will provide information to Denver Water and be useful to other utilities with similar treatment systems.

NOW, THEREFORE, in consideration of the mutual promises in this Agreement, the Parties agree as follows:

1. Scope of Work.
 - a. In accordance with the Proposal, attached and incorporated as Exhibit A, Denver Water will:
 - i. collect raw water samples from two (2) treatment plants and at points throughout the distribution system; and
 - ii. record pH and temperature data and will deliver such data and the water samples to SNWA.
 - b. In accordance with the Proposal, SNWA will:
 - i. Perform lab analysis of the samples; and
 - ii. Prepare a document that summarizes the results of the study and identifies areas of interest for further investigation.
2. Compensation. Within 30 days from execution of this Agreement by Denver Water, Denver Water shall make available the sum of Fifty Thousand dollars (\$50,000.00) to SNWA to cover the costs of this study.

**CITY AND COUNTY OF DENVER,
acting by and through its
BOARD OF WATER COMMISSIONERS**

By: _____

CEO/Manager

DATE: _____

APPROVED:

By: _____

Director of Operations and Maintenance

APPROVED AS TO FORM:

By: *Shane E. Sotice*

Legal Division

**SOUTHERN NEVADA WATER
AUTHORITY**

By: _____

Title: General Manager

REGISTERED AND COUNTERSIGNED:

Dennis J. Gallagher, Auditor

CITY AND COUNTY OF DENVER

By: _____

Exhibit A

Proposed

Proposal

**Comprehensive Occurrence Study of Nitrosamines at
Denver Water**

Submitted by:

Southern Nevada Water Authority
to
Denver Water

June 11, 2012

A. Project Abstract

Overview:

Nitrosamines are an emerging group of disinfection byproducts (DBPs) that have been associated with the application of chloramination for disinfection in water treatment plants. In particular, N-nitrosodimethylamine (NDMA) has received attention as a contaminant of rising concern. NDMA has been listed as a priority pollutant by the EPA and a public health goal of 3 ng/L has further been established by the US Office of Environmental Health Hazard Assessment. The Southern Nevada Water Authority (SNWA) has interest in researching nitrosamines for reasons of possible future applications of chloramination as a secondary disinfectant. As a prospective collaborator with SNWA, Denver Water has recently found measurable levels of NDMA within their treatment system. The facility employs chloramination as a final disinfectant and also utilizes two polymer aids during coagulation: cationic polyDADMAC and nonionic polyacrylamide. Tertiary and quaternary-based polymers (such as polyDADMAC) have been previously found to produce NDMA following disinfection and thus, examination of polymers is a key point of interest for understanding nitrosamines produced from plants utilizing these coagulant aids. Understanding nitrosamine precursors and formation at the Denver Water facility is therefore of great interest to generating safe drinking water that will meet current and future regulations. This comprehensive case study will assess the occurrence of nitrosamines at Denver Water, and provide recommendations for further mitigation strategies to be tested and validated at the bench- and pilot-scale. A focused case study will provide valuable insight into the occurrence of nitrosamines within full-scale operations.

Research objectives:

The goal of the proposed research is to identify sources and conditions (e.g. seasonal) of significant nitrosamine formation at the Denver Water treatment system so as to be able to address potential control methods for the full-scale operation. This project will include a spatially and temporally comprehensive sampling scheme in order to identify the occurrence of nitrosamines throughout the treatment and distribution systems. This study will function as a platform from which further investigations into how alterations to the existing treatment system may control the formation of nitrosamines without compromising target regulations for other DBPs and microbial pathogens.

Technical approaches:

Denver Water utilizes polymer aids early in treatment with chloramination application occurring at the very end of the treatment train. The system will be analyzed for nitrosamine formations via an occurrence study in raw waters, at locations midway through the treatment trains and at various points throughout the distribution system. To address nitrosamine occurrence, the spatial variability will be determined via an initial, comprehensive survey; as well, the temporal fluctuations will be determined via a monitoring scheme consisting of NDMA analysis performed every two weeks over the period of a year. Further formation potential tests will be run quarterly to probe the formation potential of nitrosamines and subsequent indication of nitrosamine precursors. This year-long occurrence study will address NDMA formation at Denver Water and provide data from which further mitigation strategies may be formulated and pursued. The proposed study will involve 3 tasks:

- *Task 1* will involve an initial, **comprehensive screening** of nitrosamine levels at the Denver Water treatment facility with raw and treated waters. Samples will be taken from source waters, midway through the treatment trains and in the distribution system so as to identify places of potentially problematic or elevated levels of nitrosamines. Further analysis with a formation potential assay will be used to assess the points of maximum nitrosamine precursors and to identify points of interest for continued monitoring.
- In *task 2*, research will include a **study of the temporal variability** of samples at the sites of interest highlighted by the direct measurements and formation potential tests conducted in task 1. Sampling will resume two weeks after the initial sample screening and will continue every second week over the remainder of the year at three select locations within the distribution system. The temporal variability will focus primarily on NDMA while the full suite of nitrosamines will be analyzed on a quarterly basis. Formation potential tests will likewise be run on a quarterly basis to further observe the seasonal variation in nitrosamine precursors.
- *Task 3* will include the formation of a **document to suggest strategies for the next phase to mitigate nitrosamine formation**. Appropriate bench-scale analyses will be recommended to investigate modifications and alternatives to the existing system for the elimination of nitrosamines. The document will further provide suggestions of future pilot-scale testing and insight into appropriate steps prior to implementing any full-scale modifications. Task 3 will establish suitable approaches to resolving the occurrence of nitrosamines at the Denver Water treatment plant.

Anticipated results and benefits:

The proposed research will provide information as to the occurrence of nitrosamines at Denver Water and will provide insight for subsequent future strategies to mitigate nitrosamines within the treatment system. Proposed research will include nitrosamine formation potential testing so as to identify the most problematic areas of nitrosamine precursors within raw water, the treatment systems and/or distribution system. This systematic, full-scale study is both an opportunity to resolve the occurrence of nitrosamine formation at Denver Water as well as an opportunity to provide insight to other utilities experiencing similar issues and/or with similar treatment train schemes.

Submitting Organization and Researchers:
Southern Nevada Water Authority

Participating Water Utilities:
Denver Water, CO

Budget Requested:
\$50,000

B. Table of Contents

A. Project Abstract.....	2
B. Table of Contents.....	4
C. Project Description.....	5
D. Quality Assurance/Quality Control.....	15
E. Use of Requested Budget.....	16
F. Schedule.....	17
G. References	18

C. Project Description

1. Introduction

Disinfection has long been a critical step in drinking water treatment systems but increasing concern and subsequent research has focused on the disinfection byproducts (DBPs) that result from current disinfection practices. DBPs form via the reaction of disinfectants with natural organic matter (NOM), bromide, iodide, organic contaminants and other anthropogenic sources [1-5]. With the advent of the EPA's Stage 2 DBP rule, treatment facilities have increasingly turned to the use of chloramination so as to reduce trihalomethanes (THMs) and haloacetic acids (HAAs), contaminants normally associated with traditional chlorine disinfection techniques. While THMs and HAAs pose significant health concerns, many hundreds more DBPs have been identified in recent years, some with greater health concerns than the regulated THMs and HAAs. Several chloramination-produced DBPs, including nitrosamines species, are for example, more toxic than the currently regulated species. What is becoming increasingly apparent is that no single disinfection technique is free from DBP formation but that further research is necessary to better understand the reduction of DBP formations and subsequent trade-offs necessary to keep all species minimized. Several approaches have been suggested for reducing nitrosamine formation including the optimization of chloramine operational parameters, the optimization of polymeric materials used during coagulation/flocculation, and/or removal of nitrosamine precursors (e.g. oxidation, coagulation, activated carbon use and biofiltration)[2, 6-9]. Widespread occurrence data of nitrosamines, however, is still largely lacking both within nationwide data sets as well as case studies of individual plants. The EPA method for nitrosamines, for example, does not include *N*-nitrosomorpholine (NMOR) and there is no subsequent database in the US on this highly carcinogenic nitrosamine (Table 1). Monitoring in Ontario, Canada between 1998-2007, however, resulted in the finding of measurable quantities of NMOR in 8.5% of samples collected [10], and this nitrosamine species is therefore likely to be of significance for monitoring within US water systems. With the present nitrosamine occurrence research still containing significant gaps in data, the proposed research will seek to investigate a systematic, thorough analysis of nitrosamine occurrence at a large drinking water treatment facility. The Denver Water treatment facility utilizes polymers during coagulation, utilizes chloramination as a final disinfectant step and has found measurable quantities of nitrosamines within their distribution system. Making use of samples from this treatment system, the proposed research will aim to identify nitrosamine formation with a comprehensive case study and provide insight into strategies that will aid the Denver Water system in meeting future regulations as well as to insure safe, quality drinking water to meet rising demands.

2. Background

Nitrosamines are probable carcinogens that are a serious concern to the safety of drinking waters and are generating concern globally. Nitrosamines are of greater perceived health risks than currently regulated DBP species and ironically originate in part from chloramination, a technique thought to produce overall fewer DBPs but increasingly found as a primary culprit of nitrosamine formation [3, 11]. Five nitrosamine species are acknowledged by the EPA on the final third Contaminant Candidate List (CCL-3), six are listed on the second Unregulated Contaminant Monitoring Rule 2 (UCMR2) [12] and a future group regulation of nitrosamines is likely to be pursued by the EPA. Among the most widely identified and monitored nitrosamines is *N*-nitrosodimethylamine (NDMA) and the NDMA species has been found above minimum reporting level in ~70% of treatment systems utilizing chloramination as a primary disinfection technique (UCMR2 database) [10]. The US Office of Environmental Health Hazard Assessment has issued a goal of 3 ng/L while Massachusetts, Ontario (Canada), England and Germany have established levels ranging from 1 to 10 ng/L of acceptable NDMA concentrations in drinking water. Overall, the EPA IRIS database lists nine aliphatic nitrosamines of significant health concern and these nitrosamine species are indicated in Table 1. NDMA is the most often reported owing to general higher concentrations present, but as indicated by Table 1, some of the species have substantially higher Cancer Risk Levels translating into a greater threat at lower concentrations. As such, the proposed research will focus on all nine nitrosamines and specifically address both understanding the formation of these species as well as how to minimize formation of this emerging class of DBPs. Recently, Denver Water has found measurable quantities of NDMA within their distribution system (Table 2) [12]. Denver Water utilizes chloramination as a final disinfectant as well as coagulant polymers that have been directly linked to NDMA formation [13, 14]. This research is therefore targeted to aid Denver Water in addressing nitrosamine formation within their plant by a systematic case study from which future strategies for mitigation may be proposed and implemented. The ultimate goal will include the minimization of nitrosamines, through precursor removal and/or reduction in nitrosamine formation, and will focus on accomplishing said goals via modifications of the current large-scale treatment system.

Table 1. Suite of 9 nitrosamines analyzed in the proposed research

Nitrosamine species	Cancer risk level (ng/L)	CCL3 List	UCMR2 List	MRL from UCMR2 (ng/L)
<i>N</i> -nitrosodimethylamine (NDMA)	0.7	x	x	2
<i>N</i> -nitrosomethylethylamine (NMEA)	2		x	3
<i>N</i> -nitrosodiethylamine (NDEA)	0.2	x	x	5
<i>N</i> -nitroso-di- <i>n</i> -propylamine (NDPA)	5	x	x	7
<i>N</i> -nitroso-di- <i>n</i> -butylamine (NDBA)	6		x	4
<i>N</i> -nitroso-di-phenylamine (NDPhA)	7000	x		
<i>N</i> -nitrosopyrrolidine (NPYR)	16	x	x	2
<i>N</i> -nitrosopiperidine (NPIP)	0.8			
<i>N</i> -nitrosomorpholine (NMOR)	0.8			

2.1. Denver Water drinking water treatment system

Servicing some 1.3 million customers, Denver Water provides drinking water to approximately a quarter of the state's population [15]. Denver Water's water supply originates primarily from mountain snowmelt, is stored in mountain reservoirs on the western side of the Continental Divide and is eventually carried via large tunnels to six raw water reservoirs on the eastern side of the Divide. The water from these reservoirs is carried to one of three metro-area water treatment plants where up to 280 million gallons are treated daily and sent to some 30 treated water storage reservoirs that hold more than 350 million gallons of water. Water is then sent through more than 3,000 miles of pipeline and distributed to homes and businesses throughout the Denver area [15]. Owing to the high quality of water from snowmelt, the occurrence of NDMA within the Denver Water treatment system is very possibly the result of the introduction of nitrosamine precursors within the actual treatment system as opposed to precursors existing in source waters. Occurrence data and formation potential assays performed in the proposed research will help to address the origins of the detected nitrosamines and indicate appropriate strategies to reduce nitrosamine formation.

The three metro-area treatment facilities utilize a conventional treatment train as illustrated in Figure 1. The plants use alum for coagulation as well as the cationic polymer, polyDADMAC. The plants further utilize the non-ionic polymer, polyacrylamide, at later points following coagulation and utilize chloramination for final disinfection. Of the three treatment plants, two of the plants receive the same source waters and are near-identical in design while the third varies in both source water and in treatment details. The finished water from all three collectively join in the distribution system where NDMA hits were found in 2009 during which period Denver Water was included in the monitoring for Unregulated Contaminant Monitoring Regulation (UCMR2), EPA (Table 2) [12]. Occurrence data from the EPA's second cycle of Unregulated Contaminant Monitoring Regulation (UCMR2) monitoring examined 25 contaminants including the six nitrosamines indicated in Table 1. Of the six monitored nitrosamines, only NDMA was found above the EPA's minimum reporting level as defined by UCMR2; the sampling points of these NDMA hits were in locations of maximum residence time within the distribution system at Denver Water.

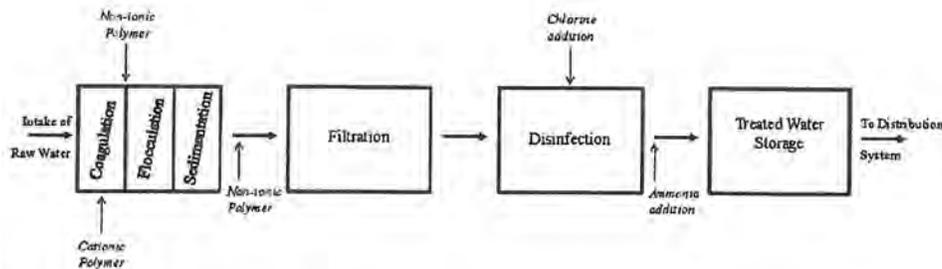


Figure 1. General schematic of treatment train in Denver Water treatment plants

Table 2. NDMA data collected from Denver Water distribution system (UCMR2, 2009)

Sample Date	Sample Name	NDMA concentration (ng/L)
01/29/2009	DS-022	<2.0
	DS-024	2.7
	DS-215	<2.0
05/06/2009	DS-022	4.0
	DS-024	2.3
	DS-215	2.7
08/04/2009	DS-022	4.7
	DS-024	3.2
	DS-215	2.0
11/03/2009	DS-022	2.8
	DS-024	2.8
	DS-215	2.5

2.2. Role of Polymers as Nitrosamine Precursors

Organic polymers are commonly used as coagulant aids within the coagulation process. Frequently, ferric chloride, aluminum sulfate or some other form of primary, inorganic coagulant will be supplemented with organic polymers to enhance the removal of organic matter and inorganic constituents that contribute to the turbidity of raw waters. Amongst the cationic polymers used, poly(diallyldimethylammonium chloride) (polyDADMAC), epichlorhydrin-based polyamines (Epi-DMA/Epi-DMA-EDA), and polyacrylamides (poly(acrylamide: N,N-dimethyl-aminoethyl acrylate) (PAM-DMAEA)/poly(acrylamide: N,N-dimethyl-aminoethyl methacrylate) (PAM-DMAEMA)) are the most commonly used polymers at drinking water treatment facilities in the U.S. Anionic (poly(acrylamide:acrylic acid)) (PAM-AA) and nonionic (polyacrylamide) (PAM) are further commonly used polymers. Research in recent years has highlighted that the formation of NDMA and nitrosamines from polymer aids occurs readily following disinfection with chlorination or chloramination [3, 13, 14, 16, 17]. These studies have provided evidence that cationic tertiary and quaternary amines have amongst the strongest NDMA formation potential with Epi-DMA demonstrating the strongest formation potential followed by the very widely used polyDADMAC [14, 16]. The primary amide structure of the anionic and nonionic polymer species, on the other hand, are expected to contribute much less NDMA formation and research interests are thus recently focused on replacing the higher NDMA-forming polymers with species that contribute much less NDMA throughout the water treatment process. Where Denver Water uses the higher NDMA-forming polymers

(polyDADMAC) within the drinking water treatment systems, this polymer may be significantly contributing to the NDMA hits encountered in the 2009 UCMR2 data (Table 2).

2.3. SNWA capabilities

The Research and Development team at SNWA is equipped with the appropriate instrumentation, skill set and expertise to identify and quantify the suite of all 9 nitrosamines to be analyzed in this project. Automated solid phase extraction (ASPE) will be used in conjunction with positive chemical ionization gas chromatography tandem mass spectrometry (PCI-GC-MS/MS) to measure all 9 nitrosamines indicated in Table 1. The project team has further had experience with formation potential tests for nitrosamines utilizing chloramination. The experimental design for the formation potential assays will be conducted following the procedures outlined in Mitch et al. (2003) and Mitch and Sedlak (2002 and 2004), [3, 18, 19]. Briefly, 1L samples will be reacted with monochloramines (2.0 mM concentrations or 140 mg/L as Cl₂) for 10 days at which time reactions will be quenched by thiosulfate and analyzed for nitrosamine content. The measurement of nitrosamines both directly from water treatment samples and following prolonged and excessive exposure to chloramination will provide information on both nitrosamine occurrence and the presence of nitrosamine precursors throughout the Denver Water treatment system.

3. Research Approach

Objectives. The objectives of the proposed research include:

- i. Spatial occurrence will first be addressed via an initial survey of nitrosamines at various points throughout the drinking water system. Points of elevated nitrosamines as well as points of elevated nitrosamine precursors will be identified within the Denver Water treatment plants and distribution system.
- ii. Characterize nitrosamine occurrence temporally over a one year period within the Denver Water system. Points of elevated nitrosamine levels will be monitored every two weeks.
- iii. Provide a document to suggest the next phase in which nitrosamine mitigation will be addressed. The suggestion document will aid in formulating appropriate research strategies to better characterize precursors and in testing plausible alterations to the existing treatment system to reduce nitrosamine occurrence.

As stated previously, two of the treatment plants at Denver Water are very similar while the third is unique; samples will be collected at one of the two similar plants and at the third (2 plants sampled in total) as well as throughout the distribution system to assess possible sources of the NDMA previously detected in the distribution system. The sampling plan for the Denver Water treatment plants is illustrated in Table 3 and will include raw water analyses, sampling midway through the two treatment trains and sampling at multiple points along the distribution system. In brief, the sampling will occur every two weeks with a more comprehensive sampling scheme occurring on a quarterly basis; the quarterly sampling will cover more sample sites, include analyses of all 9 nitrosamines listed in Table 1, and include formation potential tests so as to quantitatively assess the amount of nitrosamine precursors in samples throughout the

treatment and distribution systems. The remaining weeks of each quarter will essentially include the direct measurement of NDMA within select sites in the distribution system every second week. The measurement of only NDMA in these other sampling points will enable more samples to be run on a more frequent basis than if the full suite of nitrosamines were run on all samples. The UCMR2 data on six of the nine nitrosamines revealed NDMA as the only chemical species at concentrations above the MRL (Tables 1 and 2) and thus the four sampling periods that measure the full suite of nitrosamine species should be sufficient to provide insight into any other nitrosamines that may be present (or appear after formation potential tests) in Denver Water finished waters on a seasonal basis. Simultaneous to sample water collection, pH and temperature data will be measured by Denver Water and the data will be delivered to SNWA with the water samples. The regular monitoring of NDMA will provide insight into temporal variability within the treated water and will permit a comprehensive survey of NDMA hits over the period of an entire year.

The proposed research is designed to assess the abundance of nitrosamines, abundance of nitrosamine precursors and seasonal variations of nitrosamine formation at Denver Water. The project is divided into 3 tasks to address the 3 objectives above. More details of the proposed tasks are as follows:

3.1. Task 1: Full-scale nitrosamine monitoring in the Denver Water system

Task 1 will involve the collection of samples across the entire treatment system at Denver Water, from intake through the distribution system, and collected samples will be screened for the nine nitrosamines in Table 1. Formation potential screening will further be implemented on all samples collected to assess the presence of nitrosamine precursors throughout the treatment system.

The initial week of sampling consists of duplicate raw water samples collected from the two plants selected for sampling, 3 samples taken at points of maximum residence time within the distribution system and a duplicate of one of these sites, and a single sample taken from both plants at a chlorine-free site within each treatment train (see further details below). The reason for duplicate samples within the raw and finished (distribution) samples is so that formation potential tests may be run in parallel to direct nitrosamine measurements (i.e. nitrosamines are monitored before and after formation potential tests are run). The raw water and samples taken midway through the treatment train are not expected to have detectable quantities of NDMA or other nitrosamines; (chloramination does not occur until the very end of treatment). The raw water, however, will be directly analyzed to verify the lack of detectable nitrosamines prior to water treatment but the mid-treatment samples will only be analyzed for nitrosamines after running formation potential with chloramines. The choice of location for these mid-treatment train samples will be dependent upon chlorine residuals within the treatment system. Ideally the samples will be collected directly after sedimentation so as to assess the impacts of polymer addition during the coagulation process. Residual chlorine, however, will affect the stability of samples and thus in order to obtain samples representative of conditions within the treatment plants, samples must be at points within the treatment train that no-longer contain chlorine residual and are further from points of chlorine addition. Two possible points of sampling

include just after sedimentation (prior to chlorine addition) or post filtration (prior to disinfection). All 10 samples collected from the first week of sampling will be analyzed for the entire suite of all 9 nitrosamines so as to perform a comprehensive analysis within the first sampling week and gain insight into points of interest for further sampling in subsequent weeks.

3.2. Task 2: Full-scale nitrosamine monitoring for temporal variability

Task 2 will undertake the sampling of NDMA at select locations within the distribution system every second week. The locations will be at points of maximum residence time within the distribution system. The sampling will continue for the duration of a year. On a quarterly basis, a more complete data set will be conducted in a similar manner to the screening carried out in Task 1 and will include resampling at all points across the treatment system as well as conducting formation potential assays and measuring for the suite of all 9 nitrosamines at most sites. Samples from the distribution system, however, will only be analyzed at one site of interest where duplicate samples will be taken for direct nitrosamine analysis and for formation potential tests.

The second sampling date (in week #3) will monitor only NDMA directly in the 3 sites previously sampled in the distribution system. This trend will carry on for subsequent weeks and the duration of a year with the exception of the first week of each quarter.

The first week of the remaining quarters (weeks #15, 27, 41) will include a more thorough spatial and chemical analysis. Again, duplicate raw water samples will be collected from the two plants, duplicate samples will be taken from a select location within the distribution system and a single sample taken from both plants at a chlorine-free site within each treatment train. The duplicate samples from the raw and finished (distribution) waters will again be used to analyze formation potential in parallel to direct nitrosamine analysis. All sites in the first week of each quarter will be monitored for all 9 nitrosamines.

The remaining weeks of the 2nd-4th quarters will monitor only NDMA in the previously-selected 3 sites of interest within the distribution system and will not include formation potential testing (weeks #17-25, 29-39, 43-51).

3.3. Task 3: Next phase to mitigate nitrosamine formation at Denver Water

At the conclusion of sampling and nitrosamine lab analyses, a document will be prepared that summarizes the results of the year-long occurrence study and identifies areas of interest for further investigation. Exposure, and/or confirmation, of problematic locations in the treatment system will aid in designing appropriate mitigation strategies and identify critical points for nitrosamine precursor removal. This report will include information of likely precursors, locations of precursor introduction in raw water, in the treatment systems, and/or in the distribution system and the report will recommend subsequent steps and analyses to further pinpoint nitrosamine occurrence and nitrosamine precursor occurrence. The report will propose further analyses to assess the most promising mitigation strategies. Bench-scale analyses may be recommended to gain more detailed information about the likely nitrosamine precursors present as well as to analyze alterations to the existing treatment system to reduce overall nitrosamine

formation. These bench-scale analyses may further be applied to pilot-scale experiments to verify the applicability of such alterations to larger systems; and these results may then be applied to modify full-scale operations. The end goal of this initial survey is simply to evaluate the occurrence of NDMA and 8 other nitrosamines of concern in the Denver Water treatment system. Upon obtaining a better understanding of nitrosamine occurrence at Denver Water, further mitigation strategies may be addressed. Denver Water will be used for a systematic, full-scale study of nitrosamine occurrence and will provide insight for other drinking water utilities using similar treatment techniques.

Table 3. Detailed outline of samples collected at two Denver Water treatment plants and subsequent experimental analyses

Quarter/ Week #	Samples for direct nitrosamine analysis		Samples collected to undergo Formation Potential tests			Analyses to ID and quantify nitrosamines		
	Raw water*	Dist. System ¹	Raw water ²	Treat. Train ²	Dist. System ²	Just NDMA	All 9 Nitrosamines	
1st	1	2	3	2	2	1	-	10
	3	-	3	-	-	-	3	-
	5	-	3	-	-	-	3	-
	7	-	3	-	-	-	3	-
	9	-	3	-	-	-	3	-
	11	-	3	-	-	-	3	-
13	-	3	-	-	-	3	-	
2nd	15	2	1	2	2	1	-	8
	17	-	3	-	-	-	3	-
	19	-	3	-	-	-	3	-
	21	-	3	-	-	-	3	-
	23	-	3	-	-	-	3	-
	25	-	3	-	-	-	3	-
3rd	27	2	1	2	2	1	-	8
	29	-	3	-	-	-	3	-
	31	-	3	-	-	-	3	-
	33	-	3	-	-	-	3	-
	35	-	3	-	-	-	3	-
	37	-	3	-	-	-	3	-
39	-	3	-	-	-	3	-	
4th	41	2	1	2	2	1	-	8
	43	-	3	-	-	-	3	-
	45	-	3	-	-	-	3	-
	47	-	3	-	-	-	3	-
	49	-	3	-	-	-	3	-
	51	-	3	-	-	-	3	-
TOTALS	8	72	8	8	4	66	34	
					100 collected		100 analyzed	

* One sample is collected from each of the two studied treatment plants.

[†]All samples on a given date are collected at different points along the distribution system.

**Samples are collected as duplicates of samples for direct nitrosamine analysis (i.e. samples are analyzed for nitrosamines "before and after" formation potential assays).

[†] One sample is collected from each of the two studied treatment plants for formation potential assays. Location in Treatment Train is directly after sedimentation or filtration; site determined by the absence of a chlorine residual.

BLUE indicates that samples are analyzed for NDMA only.

YELLOW indicates that samples are analyzed for all 9 nitrosamines.

D. Quality Assurance/Quality Control (QA/QC)

Accuracy and precision of all analyses will be ensured by proper planning, attentive sample handling and careful execution of experimental procedures. Sample collection, analytical measurements, data analysis, statistical analysis and subsequent reports will be handled carefully and prevented, whenever possible, from the introduction of human and/or systematic errors. Careful instrument calibration, handling of samples, refinement of experimental procedures and use of blanks and other quality control procedures will aid in QA/QC.

Nitrosamines will be analyzed at SNWA for task 1 and task 2. Isotopically labeled nitrosamines will be used with automated solid phase extraction (ASPE) with pre-packed activated charcoal SPE (Restek 521). Positive chemical ionization gas chromatography tandem mass spectrometry (PCI-GC-MS/MS) with a Varian 4000 Ion Trap GC-MS/MS system and a DB-624 (30 m x 0.25 mm x 1.4 μ m) column will be used to measure the extracts for either all 9 nitrosamines or only the NDMA species. MRLs for all nine nitrosamines are likely to range from about 2.5 to 25 ng/L.

Upon arrival at SNWA, samples will be stored at 4°C and analyzed for direct nitrosamine analysis as well as nitrosamine formation potential tests within 48 hours of sample collection. All glassware for formation potential tests will be acetone rinsed and baked for 3 hours at 400°C. Formation potential reactions will be carried out at 25°C, shielded from light and at a pH of 6.8 (with 10 mM phosphate buffer). Standardized HOCl solutions will be used to produce monochloramine solutions at 2.0 mM (140 mg/L as Cl₂) and made fresh daily. The formation potential tests will be permitted to react for 10 days at which time 100 mg/L thiosulfate will be added to quench the chlorinating agent and samples will then be analyzed for nitrosamines with the method mentioned above.

Each batch of samples (both with direct nitrosamine analysis and with formation potential tests) will include a deionized (DI) water blank so as to detect any elevated background or laboratory contamination (with acceptable levels < 1/3 of the associated MRL). Each batch of samples will also include one nitrosamine blank at mid-range concentration to verify the accuracy of the extraction technique. Matrix spikes will be used to determine if constituents within the water samples affect the method performance and travel blanks will be collected simultaneous to water samples to identify any contamination occurring as a result of sample collection procedures. All quality control procedures and subsequent results will be thoroughly carried out and recorded.

E. Use of Requested Budget

The NDMA and full suite nitrosamine analyses are estimated to cost \$33,500 based upon the proposed sampling scheme. An allotment of \$8000 is estimated for personnel labor associated with project organization, report writing, communication, data interpretation and running formation potential tests. Shipping costs are estimated at \$2000 for SNWA to mail sample collection materials to Denver Water every second week over the duration of a year. A further \$5000 is estimated for travel costs for 2 personnel to visit Denver Water twice to first coordinate details of the project and secondly to report findings after the sampling and data analyses are completed.

Nitrosamine analyses	<i>Identification and quantification of NDMA and other 3 nitrosamines</i>	33,500
Chemicals and supplies	<i>Supplies for sample collection and formation potential tests</i>	1500
Shipping costs	<i>Sample bottles shipped to DW</i>	2000
Travel	<i>Two personnel from SNWA will visit DW twice</i>	5000
Personnel	<i>Organization, report writing, communication, data interpretation and running formation potential tests. Estimated: 150 hours of labor</i>	8000
TOTAL		\$50,000

F. Schedule

The proposed research is designed for 12 months of sampling and up to 2 months further to finish lab analyses, finalize data compilation and formulate a mitigation suggestion document. The project is anticipated to begin July, 2012, finish sample collection in June 2013 and have all data and reporting completed by August 2013. The proposed schedule is illustrated in Table 4 below:

Table 4. Schedule of research

TASKS	2012						2013							
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Task 1														
Task 2														
Task 3														
Reports				QR			QR			QR			QR	FR

QR: quarterly report, FR: final report

G. References

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SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
 November 15, 2012

Subject: Agreement	Director's Backup
Petitioner: John J. Entsminger, Senior Deputy General Manager	
Recommendations: That the Board of Directors approve an interlocal agreement among the City of Henderson, the City of Las Vegas, Clark County, the Regional Transportation Commission of Southern Nevada, the Clark County Water Reclamation District, and the Authority to establish funding allocations for the Clark County Aerial Imagery Project for a period of three years from January 1, 2013.	

Fiscal Impact:

If the above recommendation is approved, \$90,500 will be added to the New Expansion Debt Fund commitments over the three-year period, with expenditures not to exceed \$25,500 in 2013, and not to exceed \$32,500 in 2014 and 2015, respectively.

Background:

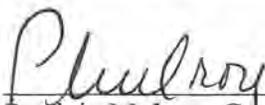
Since 2006, high resolution aerial imagery has been used as an integral part of the Authority's Water Smart Landscape Program. In recent years, the Authority has partnered with local and federal agencies to share costs to obtain this high resolution imagery. As a result, these partnerships have reduced project costs and program duplication.

If approved, the attached Interlocal Agreement establishes the Clark County Imagery Project (Imagery Project) and outlines the terms and conditions for a partnership to share costs to acquire aerial imagery for various projects among the signatories. The Interlocal Agreement also authorizes the Authority to obligate funds to secure aerial imagery services beginning January 2013. If approved under a separate agenda item, Sanborn Map Company, Inc., will acquire the aerial imagery for three years.

The total annual cost of the Imagery Project will not exceed \$130,000 cumulatively for all participating parties. Imagery Project costs will be shared as indicated in Section 1, Table A, of the Interlocal Agreement. In June 2012, the Board of Directors approved a grant and assistance agreement with the United States Geological Survey for the Authority to receive \$55,000, of which \$24,000 remains unspent; and in July 2012, the Board approved a grant and assistance agreement with the Bureau of Reclamation for the Authority to receive \$75,000 over a three-year period beginning in 2013. Proceeds from these grants are included in the Interlocal Agreement's cost distribution.

This agreement is being entered into pursuant to NRS Chapter 277 and Section 6(j) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this agreement.

Respectfully submitted:


 Patricia Mulroy, General Manager
 PM:JJE:ZLM:GAF:CAH:db:nh
 Attachment

AGENDA ITEM #	4
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**INTERLOCAL AGREEMENT AMONG THE CITY OF HENDERSON, CITY OF LAS VEGAS,
CLARK COUNTY, CLARK COUNTY WATER RECLAMATION DISTRICT, THE REGIONAL
TRANSPORTATION COMMISSION OF SOUTHERN NEVADA, AND THE SOUTHERN NEVADA
WATER AUTHORITY TO ESTABLISH FUNDING ALLOCATIONS FOR CLARK COUNTY
IMAGERY PROJECT**

This Interlocal Agreement is entered into by the City of Henderson ("Henderson"); the City of Las Vegas ("Las Vegas"); Clark County ("County"); the Clark County Water Reclamation District ("CCWRD"); the Regional Transportation Commission of Southern Nevada ("RTC"); and, the Southern Nevada Water Authority ("Authority") this _____ day of _____, 2012.

WHEREAS, Nevada Revised Statutes Chapter 277.180 provides that two or more public agencies may enter into an interlocal Agreement for the performance of any governmental service, activity or undertaking which any of said agencies is authorized by law to perform; and

WHEREAS, the parties hereto maintain a Geographic Information System (hereinafter "GIS") capable of providing automated graphic display and analysis, and multiple data layers and information (e.g., land records, land use and facilities); and

WHEREAS, the parties hereto, all of which have incurred considerable costs associated with the development and implementation of their respective GIS, desire to share access to their GIS resources and data sets more fully described below as part of a cooperative effort on the part of the parties hereto to provide a more cost effective and efficient operation of their GIS for use by the public; and

WHEREAS, southern Nevada has been in a prolonged drought for more than a decade, negatively impacting the water resources available for the region; and

WHEREAS, the Authority utilizes GIS and high-resolution aerial imagery in conjunction with the Authority's Water Smart Landscape ("WSL") Program to promote the conservation of water resources throughout southern Nevada; and

WHEREAS, the Authority has incurred significant costs associated with the acquisition of high-resolution aerial imagery of the Las Vegas Valley region and work related to evaluating and performing quality checks on the imagery, which is used by numerous agencies to develop and improve their respective GIS resources; and

WHEREAS, the County has incurred significant costs associated with the acquisition of aerial imagery of the Clark County region and work related to evaluating and performing quality checks on the imagery, which is used by numerous agencies to develop and improve their respective GIS resources; and

WHEREAS, the County provides on-line map services, as technically feasible, which allow interested agencies the ability to access imagery using software capable of such; and

WHEREAS, a separate Agreement exists referred to as the Southern Nevada Geographic Information Interlocal Agreement which provides for a central repository of GIS data; and

WHEREAS, representatives of the parties hereto, together with representatives of other political subdivisions in Clark County, all of whom share a common interest in the development and improvement of their respective GIS, have met periodically for the purpose of exploring potential markets and marketing techniques for the sale of their respective GIS data, which may have the benefit of lowering the operational costs for each governmental entity that elects to participate with the parties hereto in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained, the Parties hereto agree as follows:

SECTION 1. ANNUAL FUNDING FEE.

a. Within thirty (30) calendar days after notice from the Authority, which will be given on or around June 15th of the annual imagery cycle, Henderson, Las Vegas, CCWRD, RTC, and the County, shall pay to the Authority their annual funding fee (“Annual Funding Fee”), which will not exceed \$32,500 for an annual cycle for the County or the Authority, or \$10,000 for an annual cycle for each of the remaining parties. See Table A below for current projected Imagery Project Fee Table:

**TABLE A
IMAGERY PROJECT FEE TABLE**

AGENCY	2013	2014	2015
SOUTHERN NEVADA WATER AUTHORITY	\$25,500	\$32,500	\$32,500
CLARK COUNTY	\$25,500	\$32,500	\$32,500
CITY OF HENDERSON	\$7,500	\$10,000	\$10,000
CITY OF LAS VEGAS	\$7,500	\$10,000	\$10,000
CLARK COUNTY REGIONAL TRANSPORTATION COMMISSION	\$7,500	\$10,000	\$10,000
CLARK COUNTY WATER RECLAMATION DISTRICT	\$7,500	\$10,000	\$10,000
UNITED STATES GEOLOGICAL SURVEY (via Grant)	\$24,000	-	-
BUREAU OF RECLAMATION (via Grant)	\$25,000	\$25,000	\$25,000

b. If any additional funding provided by Federal grants, from a new party, or other sources become available, the Annual Funding Fee will be re-calculated as follows:

- The 6” aerial imagery costs (initially estimated at \$130,000) less all non-party related funding = the Party Responsible Funding amount
- The Party Responsible Funding amount will be allocated amongst all parties (current + new)
- The allocated amounts assigned to each party in total shall not exceed the Party Responsible Funding amount
- The allocation will be of equal amounts to all parties excluding the Authority and the County
- The Authority and the County allocation amounts shall be calculated at a multiplier of 3.25x larger than the amount allocated to the remaining parties

Any resulting refund due to parties stemming from the collection of additional funding shall be paid in the form of a check from the Authority to the party unless the party notifies the Authority in writing of an alternative method to administer the credit due.

c. Subsequent to the execution of this Agreement by the initial parties hereto, any public agency desiring to become part of this Agreement must receive approval from the majority of the current parties, and such approval as a party to this Agreement will be subject to the condition that the public agency pay the Annual Funding Fee as set forth in paragraph 1-b. The Annual Funding Fee will not be prorated based on the date a new party is added to the Agreement (i.e., a full year assessment as set forth in paragraph 1-b will be due from the new party and will apply only until June 30th of the current fiscal year).

d. Notification of the new fiscal year’s rate will be sent to the parties by February 1st of the current annual year.

SECTION 2. TERM AND RIGHT OF TERMINATION.

a. This Agreement will remain in force from January 1, 2013 or the date it is ratified by appropriate official action of the governing body of each party, whichever is later, through December 31, 2015.

b. In the event that any party other than the Authority wishes to withdraw from this Agreement, that party is required to notify all other parties of its intention to withdraw by October 31 of a given annual cycle. The withdrawing party will not receive a refund for the current cycle, but will not be required to contribute for any following periods. If notification is given after October 31, the party will still be required to pay its share for the following annual imagery cycle.

SECTION 3. SERVICES.

Each party will be provided with the services, as available, described as follows:

a. The Authority will have responsibility in managing the imagery project, including acquisition and related quality assurance work to ensure imagery is of the highest quality. The Authority will be solely responsible for working directly with contractor on the imagery project. The Authority will ensure flight schedules meet County requirements. The Authority will have final approval on imagery delivery and acceptance after ensuring imagery delivery meets the County's quality standards and prior to distributing data.

b. The Authority will publish a map annually for all parties that shows the areas for which imagery will be acquired for the annual cycle.

c. After receiving the imagery data from the Authority, the County will load the imagery data into the GIS Central Repository and make it available to the Participants of the Southern Nevada Geographic Information Interlocal Agreement and govern the data by the terms related to that Agreement.

d. Additions or deletions to the standard Acquisition area must be submitted to the Authority by November 15 of the given calendar year. Deletions have to be approved by all parties prior to removal from acquisition, by December 15 of the given calendar year. Any additions that exceed the given budget for the annual Agreement (\$130,000) must be covered by the requesting party or parties. The party or parties must also work directly with the Authority's contractor to pay for the additional areas requested.

SECTION 4. EFFECTIVE DATE.

This Agreement becomes effective when the duplicate originals are executed and dated by all parties, realizing that each entity, by necessity, must approve and execute the subject document at different places and on different dates.

SECTION 5. SEVERABILITY.

Should any part of this Agreement be rendered void, invalid, or unenforceable by any court of law for any reason, such determination shall not render void, invalid or unenforceable under any other part of this Agreement.

SECTION 6. GOVERNING LAW.

The laws of the State of Nevada will govern as to the interpretation, validity and effect of this Agreement.

SECTION 7. THIRD PARTY BENEFICIARIES.

This Agreement is intended only to benefit the parties hereto and does not create any rights, benefits or causes of action for any other person, entity or member of the general public.

SECTION 8. ONE TIME AGREEMENT.

It is specifically recognized and agreed by all parties hereto, that this Agreement is not to be interpreted or constructed as establishing a precedent for any further agreement, covenant or commitment on the part of any party hereto and should be considered a standalone document without establishing any future obligations, other than as described herein, on the part of any party hereto.

SECTION 9. COUNTERPART SIGNATURES.

This Agreement may be executed in counterparts, all such counterparts will constitute the same contract and the signature of any party to any counterpart will be deemed a signature to, and may be appended to, any other counterpart. Executed copies hereof may be delivered by facsimile or e-mail and upon receipt will be deemed originals and binding upon the parties hereto, regardless of whether originals are delivered thereafter.

INTERLOCAL AGREEMENT AMONG THE CITY OF HENDERSON, CITY OF LAS VEGAS,
CLARK COUNTY, CLARK COUNTY WATER RECLAMATION DISTRICT, CLARK COUNTY
REGIONAL TRANSPORTATION COMMISSION, AND THE SOUTHERN NEVADA WATER AUTHORITY
TO ESTABLISH FUNDING ALLOCATIONS FOR THE CLARK COUNTY IMAGERY PROJECT

SOUTHERN NEVADA WATER AUTHORITY

Shari L. Buck, Chair

Approved as to form:

Approved on _____, by the Board of Directors
for the Southern Nevada Water Authority.

Brian Chally, Director, Legal Services

CITY OF HENDERSON

ATTEST:

By: _____
Andy Hafen Date
Mayor

By: _____
Sabrina Mercadante, MMC
City Clerk

Approved as to legality and form:

By: _____
Josh M. Reid
City Attorney

INTERLOCAL AGREEMENT AMONG THE CITY OF HENDERSON, CITY OF LAS VEGAS,
CLARK COUNTY, CLARK COUNTY WATER RECLAMATION DISTRICT, CLARK COUNTY
REGIONAL TRANSPORTATION COMMISSION, AND THE SOUTHERN NEVADA WATER AUTHORITY
TO ESTABLISH FUNDING ALLOCATIONS FOR THE CLARK COUNTY IMAGERY PROJECT

CITY OF LAS VEGAS

ATTEST:

By: _____
Carolyn G. Goodman Date
Mayor

By: _____
Beverly K. Bridge, MMC
City Clerk

Approved as to legality and form:

By: _____
Deputy City Attorney

CLARK COUNTY
Board of County Commissioners

ATTEST:

Susan Brager
Chair

Diana Alba
County Clerk

Date of Official Action:

Approved as to Form:

Steven Sweikert
Deputy District Attorney

INTERLOCAL AGREEMENT AMONG THE CITY OF HENDERSON, CITY OF LAS VEGAS,
CLARK COUNTY, CLARK COUNTY WATER RECLAMATION DISTRICT, CLARK COUNTY
REGIONAL TRANSPORTATION COMMISSION, AND THE SOUTHERN NEVADA WATER AUTHORITY
TO ESTABLISH FUNDING ALLOCATIONS FOR THE CLARK COUNTY IMAGERY PROJECT

**CLARK COUNTY WATER
RECLAMATION DISTRICT**

ATTEST:

By: _____
Richard Mendes Date
General Manager

By: _____
Diana Alba
County Clerk

Approved as to legality and form:

By: _____
Carolyn Campbell
Deputy District Attorney

**CLARK COUNTY REGIONAL
TRANSPORTATION COMMISSION**

ATTEST:

By: _____
Tina Quigley Date
General Manager

By: _____

Approved as to legality and form:

By: _____
Zev Kaplan
Attorney

SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
November 15, 2012

Subject: Amendment	Director's Backup
Petitioner: John J. Entsminger, Senior Deputy General Manager	
Recommendations: That the Board of Directors approve Amendment No. 1 to the existing agreement between Sanborn Map Company, Inc., and the Authority for digital aerial imagery services authorizing an increase in compensation for an amount not to exceed \$60,000 annually for the period from January 1, 2013, through December 31, 2015.	

Fiscal Impact:

None by approval of the above recommendation. The previous commitment of \$70,000 will be increased to \$130,000; however, these costs are provided for through a separate item before the Board of Directors for consideration today.

Background:

On March 12, 2012, the General Manager approved a professional services agreement with Sanborn Map Company, Inc. (Sanborn), RFP 638-11, to acquire digital aerial images of the Las Vegas Valley and the Boulder City region for an amount not to exceed \$70,000, with the option of a 10 percent annual increase for three additional renewals. This imagery is being utilized in support of Authority projects including the Water Smart Landscape Program.

To offset project costs, the cities of Henderson and Las Vegas agreed to contribute an amount not to exceed \$15,000 each towards the project annually. These contributions, combined with grants from the United States Geological Survey (USGS) and the Bureau of Reclamation (Reclamation) as described below, left the Authority's total committed amount not to exceed \$111,520 between 2012 and 2015, which includes \$94,020 for years 2013 through 2015.

In the summer of 2012, the Authority began work on a joint effort to establish the Clark County Imagery Project (Imagery Project) among Clark County, the cities of Henderson and Las Vegas, the Clark County Water Reclamation District, and the Regional Transportation Commission of Southern Nevada. The Imagery Project will coordinate additional funding contributions to acquire imagery in areas of Clark County that are in addition to those areas acquired by the Authority through its agreement with Sanborn.

The total annual cost of the Imagery Project will not exceed \$130,000 cumulatively for all participating parties. Imagery Project costs will be shared as indicated in Section 1, Table A, of the Interlocal Agreement. In June 2012, the Board of Directors approved a grant and assistance agreement with the USGS for the Authority to receive \$55,000, of which \$24,000 remains unspent; and in July 2012, the Board approved a grant and assistance agreement with the Bureau for the Authority to receive \$75,000 over a three-year period beginning in 2013. Proceeds from these grants are included in the cost distribution of the Interlocal Agreement going before the Board today.

AGENDA ITEM #	5
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Amendment
November 15, 2012
Page Two

This amendment is being entered into pursuant to NRS 332.115 and Section 6(p) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this amendment.

Respectfully submitted:



Patricia Mulroy, General Manager
PM:JJE:ZLM:GAF:CAH:db:nh
Attachments

AMENDMENT NO. 1
to the
AGREEMENT
between
THE SANBORN MAP COMPANY, INC.
and
SOUTHERN NEVADA WATER AUTHORITY

Whereas the parties to the original agreement, executed on **March 12, 2012**, desire to continue the relationship whereby **The Sanborn Map Company, Inc.** will provide additional Digital Aerial Imagery professional services to the Authority as directed. The agreement is hereby modified as follows:

Revise Section 1 Scope of Work to read as follows:

In addition to Blocks 1-4, Consultant will acquire imagery in areas outlined in **Block 5** of Request for Proposal (RFP) 638-11 Addendum #1, with same technical specifications and special conditions used for Blocks 1-4.

Revise Section 4 Limitation on Costs to read as follows:

Increase the total amount of the compensation by an additional **\$60,000**, which increases the total compensation amount of the agreement to **\$130,000**.

All other terms and conditions of the original agreement remain in full force and effect.

DATED this ____ day of ~~October~~^{November}, 2012.

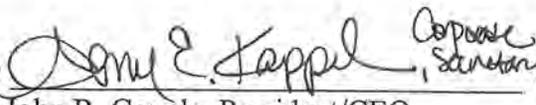
APPROVED AS TO FORM:



Brian Chally, Director, Legal Services

THE SANBORN MAP COMPANY, INC.

SOUTHERN NEVADA WATER AUTHORITY

By: ^{Copple}
~~sol~~ John R. Copple, President/CEO

By: _____
Patricia Mulroy, General Manager



I, James A. Curtin, Vice President of The Sanborn Map Company, Inc., a corporation duly organized under the laws of the state of Delaware, certify that the Board of Directors adopted, by written consent on May 14, 2010 the following resolution with the same force and effect as if it had been unanimously at a duly convened meeting of the Board:

RESOLVED: That Amy E. Kappel be and hereby is authorized, directed and empowered for, in the name and on behalf of this Corporation to sign, seal with corporate seal, execute, acknowledge and deliver all contracts, bonds and other obligations of the corporation by such actions to be valid and binding upon this Corporation for all purposes. This resolution shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent resolution of the Board of Directors.

I further certify that Amy E. Kappel is the duly elected Secretary of The Sanborn Map Company, Inc.

Signed

James A. Curtin
Vice President

This resolution has not been modified or amended to date.
October 5, 2012

(Corporate Seal)

DISCLOSURE OF OWNERSHIP/PRINCIPALS

Business Entity Type						
<input type="checkbox"/> Sole Proprietorship	<input type="checkbox"/> Partnership	<input type="checkbox"/> Limited Liability Company	<input checked="" type="checkbox"/> Corporation	<input type="checkbox"/> Trust	<input type="checkbox"/> Non-Profit Organization	<input type="checkbox"/> Other
Business Designation Group						
<input type="checkbox"/> MBE	<input type="checkbox"/> WBE	<input type="checkbox"/> SBE	<input type="checkbox"/> PBE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minority Business Enterprise	Women-Owned Business Enterprise	Small Business Enterprise	Physically Challenged Business Enterprise			
Corporate/Business Entity Name:		The Sanborn Map Company, Inc.				
(Include d.b.a., if applicable)		N/A				
Street Address:		1935 Jamboree Drive, Suite 100		Website: http://www.sanborn.com		
City, State and Zip Code:		Colorado Springs, CO 80920-5358		POC Name and Email: Amy E. Kappel akappel@sanborn.com		
Telephone No:		(719) 264-5510		Fax No: (719) 528-5093		
Local Street Address:		N/A		Website: N/A		
City, State and Zip Code:		N/A		Local Fax No: N/A		
Local Telephone No:		N/A		Local POC Name Email: N/A		
Number of Clark County, Nevada Residents Employed: 0						

All entities, with the exception of publicly-traded and non-profit organizations, must list the names of individuals holding more than five percent (5%) ownership or financial interest in the business entity appearing before the SNWA Board of Directors.

Publicly-traded entities and non-profit organizations shall list all Corporate Officers and Directors in lieu of disclosing the names of individuals with ownership or financial interest. The disclosure requirement, as applied to land-use applications, extends to the applicant and the landowner(s).

Entities include all business associations organized under or governed by Title 7 of the Nevada Revised Statutes, including but not limited to private corporations, close corporations, foreign corporations, limited liability companies, partnerships, limited partnerships, and professional corporations.

Full Name	Title	% Owned <small>(Not required for Publicly Traded Corporations/Non-profit organizations)</small>
John R. Copple	President & CEO	51%

This section is not required for publicly-traded corporations.

1. Are any individual members, partners, owners or principals, involved in the business entity, an SNWA full-time employee(s), or appointed/elected official(s)?
 - Yes No (If yes, please note that SNWA employee(s), or appointed/elected official(s) may not perform any work on professional service contracts, or other contracts, which are not subject to competitive bid.)

2. Do any individual members, partners, owners or principals have a spouse, registered domestic partner, child, parent, in-law or brother/sister, half-brother/half-sister, grandchild, grandparent, related to an SNWA full-time employee(s), or appointed/elected official(s)?
 - Yes No (If yes, please complete the Disclosure of Relationship form on Page 2. If no, please print N/A on Page 2.)

I certify under penalty of perjury, that all of the information provided herein is current, complete, and accurate. I also understand that the SNWA will not take action on land-use approvals, contract approvals, land sales, leases or exchanges without the completed disclosure form.

Amy E. Kappel

Signature
Corporate Secretary

Title

Amy E. Kappel

Print Name
September 26, 2012

Date

DISCLOSURE OF RELATIONSHIP

List any disclosures below:
(Mark N/A, if not applicable.)

NAME OF BUSINESS OWNER/PRINCIPAL	NAME OF SNWA EMPLOYEE OR OFFICIAL AND JOB TITLE	RELATIONSHIP TO SNWA EMPLOYEE OR OFFICIAL	SNWA EMPLOYEE'S/OFFICIAL'S DEPARTMENT
N/A	N/A	N/A	N/A

"Consanguinity" is a relationship by blood. "Affinity" is a relationship by marriage.

"To the second degree of consanguinity" applies to the candidate's first and second degree of blood relatives as follows:

- Spouse – Registered Domestic Partners – Children – Parents – In-laws (first degree)
- Brothers/Sisters – Half-Brothers/Half-Sisters – Grandchildren – Grandparents – In-laws (second degree)

For SNWA Use Only:

If any Disclosure of Relationship is noted above, please complete the following:

Yes No Is the SNWA employee(s) noted above Involved in the contracting/selection process for this particular agenda item?

Yes No Is the SNWA employee(s) noted above Involved in any way with the business in performance of the contract?

Notes/Comments:


Signature

Greg A. Febbe Sr.
Print Name
Authorized Department Representative

SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
November 15, 2012

Subject: Adoption of the 2012 Water Budget	Director's Backup
Petitioner: John J. Entsminger, Senior Deputy General Manager	
Recommendations: That the Board of Directors adopt the 2012 Water Budget for the Authority.	

Fiscal Impact:

None by approval of the above recommendation.

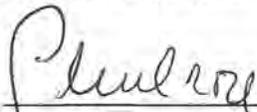
Background:

The SNWA 1995 Amended Cooperative Agreement requires that the Authority adopt a Water Budget (Budget) showing the water resources available to the Authority and its member agencies. The Budget is reviewed at least annually and revised if appropriate. Staff prepared the proposed 2012 Budget with input from the Authority's member agencies. The Budget shows actual water usage by each purveyor member and by water source through 2011 as well as annual supply and demand projections through 2015.

The Budget is intended to complement the Water Resource Plan, providing short-term, detailed forecasts, while the Water Resource Plan focuses on longer-term, regional supply and demand issues. The Board of Directors adopted the Water Resource Plan for another year in October 2012.

This action is authorized by Section 5(j) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this agenda item.

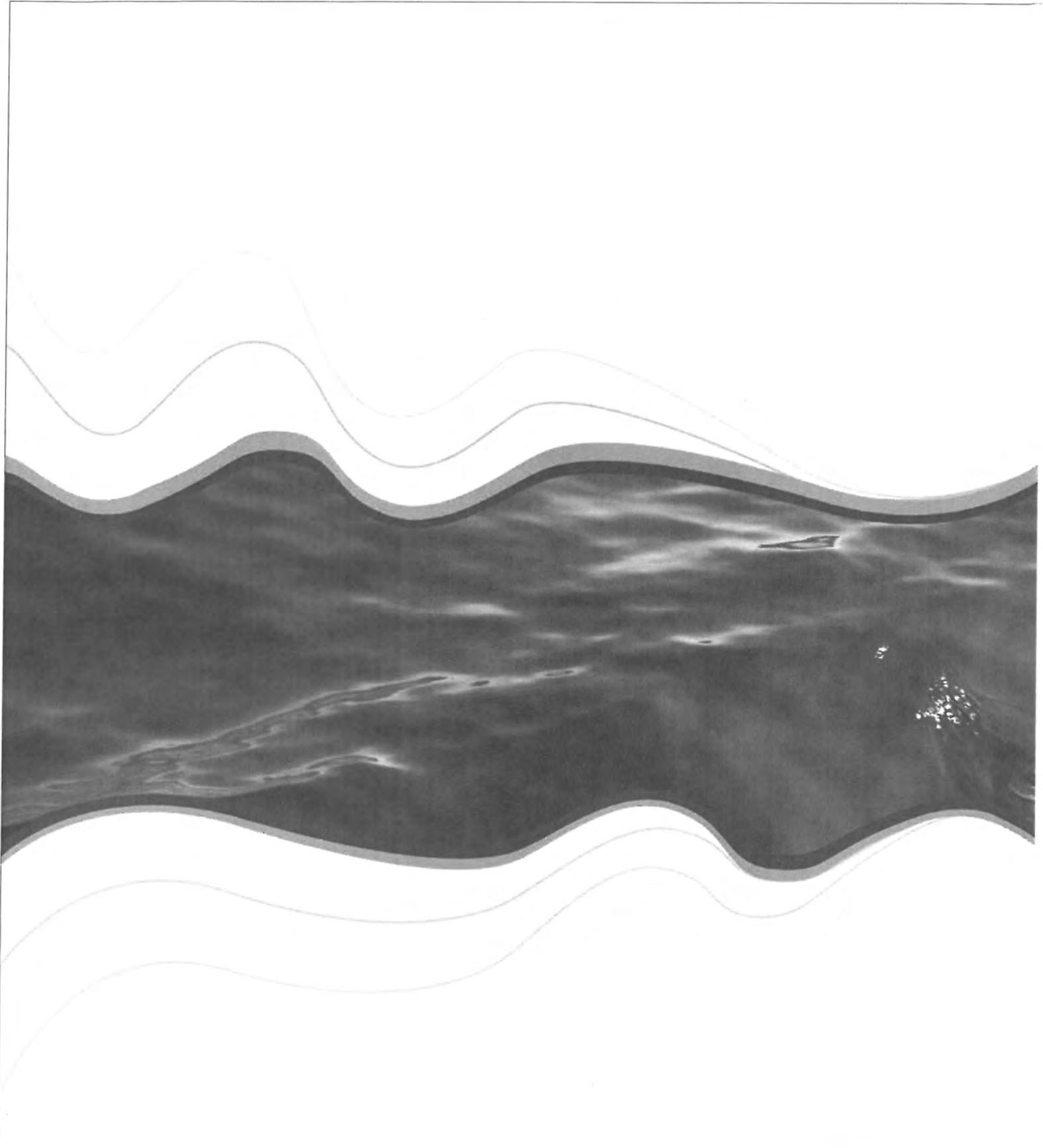
Respectfully submitted:



Patricia Mulroy, General Manager
PM:JJE:RBH:BCM:JJ:TM:lmv
Attachment

AGENDA ITEM #

6



Water Budget **12**
 SOUTHERN NEVADA WATER AUTHORITY

Southern Nevada Water Authority

Board of Directors

Shari Buck, Chair
City of North Las Vegas

Mary Beth Scow, Vice Chair
Las Vegas Valley Water District

Sam Bateman
City of Henderson

Bob Coffin
City of Las Vegas

Tom Collins
Clark County Water Reclamation District

Duncan McCoy
City of Boulder City

Steve Sisolak
Big Bend Water District

Patricia Mulroy, General Manager

Member Managers

Elizabeth Fretwell, City of Las Vegas • Vicki Mayes, City of Boulder City
Richard Mendes, Clark County Reclamation District • Timothy Hacker, City of North Las Vegas
Patricia Mulroy, Las Vegas Valley Water District • Patricia Mulroy, Big Bend Water District
Jacob Snow, City of Henderson



Summary

The Southern Nevada Water Authority (SNWA), as part of its Cooperative Agreement, is required to produce a water budget showing water resources available to the SNWA and its member agencies and water demands for each purveyor member. It is reviewed annually by the SNWA Board of Directors and revised as needed.

The SNWA staff has prepared this 2012 Water Budget with input from technical representatives of the member agencies. The document consists of eight tables showing annual potable and non-potable water demand projections, by purveyor, for the years 2012 through 2015, as well as actual demands for the years 2009 through 2011.

The Water Budget is short-term in focus, with detailed forecasts provided by each purveyor for its respective service area. The water demands in this Water Budget differ from the regional forecasts in the Water Resource Plan. Water demands in the Water Resource Plan are generated for the SNWA purveyor service area as a whole. The intent of the Water Resource Plan is to focus on the resources available to the region for the long-term. The Water Resource Plan should be consulted to understand what water resources are projected to meet long-term regional water demands. The Water Budget is a good source document for water demand and supply details of a specific purveyor service area for the next few years.

Major Findings

- Nevada's 2011 Colorado River consumptive use was approximately 223,000 acre-feet, including approximately 7,000 acre-feet of water banked through direct and in-lieu recharge in the Las Vegas Valley. SNWA created approximately 32,000 acre-feet of Intentionally Created Surplus (ICS) credits during 2011 by conserving purchased and leased water rights on the Muddy and Virgin Rivers and pumping Coyote Spring Valley Groundwater and conveying it to Lake Mead for storage. Nevada left approximately 77,000 acre-feet of unused Nevada Colorado River water in Lake Mead. This provides a benefit to the Colorado River system and the elevation of Lake Mead.
- The 2012 Water Budget projects Nevada Colorado River water consumptive use without direct recharge to be between approximately 231,000 and 250,000 acre-feet per year between 2012 and 2015. SNWA plans to create approximately 100,000 acre-feet of ICS credits during this same period. During this period, SNWA will manage available resources by banking in the Las Vegas Valley, interstate banking, and leaving a portion of the available unused water in Lake Mead benefiting system storage and Lake Mead elevation.
- Between 2009 and 2011, some purveyors are projected to utilize all of their long-term resources and available purveyors' unused Nevada Colorado River water, as allowed for in the SNWA 1992 Water Delivery Contract and Cooperative Agreement. In addition, other water sources detailed in the 2009 Water Resource Plan may be used to

meet demands during this period. The utilization of reclaimed water (wastewater reuse) is projected to grow from approximately 17,000 acre-feet a year to approximately 19,000 acre-feet a year during the period 2012 to 2015.

2012 SNWA Water Budget, November 15, 2012

TABLE 1: CUSTOMER WATER USAGE, numbers in acre-feet per year (a)

POTABLE	2009	2010	2011	2012	2013	2014	2015
Groundwater customer usage (GW)							
LVVWD	40,629	39,208	40,629	40,629	40,629	40,629	40,629
North Las Vegas	1,511	633	1,236	3,500	4,500	4,500	4,500
Total	42,140	39,841	41,865	44,129	45,129	45,129	45,129
Colorado River customer usage (CR)							
Deliveries							
Big Bend (Laughlin)	4,423	4,345	4,339	4,399	4,413	4,449	4,485
Boulder City (b)	10,980	10,663	10,079	10,934	10,934	10,934	10,934
Henderson (b)	80,748	77,835	77,258	78,893	80,480	82,800	85,099
LVVWD	292,645	283,514	278,423	275,421	277,568	285,391	293,008
North Las Vegas	51,203	50,270	48,260	48,400	48,592	48,992	49,490
Total	439,999	426,627	418,359	418,047	421,987	432,566	443,016
Recovery of artificial recharge (AR recovery)							
Big Bend (Laughlin)	0	0	0	0	0	0	0
Boulder City	0	0	0	0	0	0	0
Henderson	0	0	0	0	0	0	0
LVVWD (c)	11	0	156	0	0	0	0
North Las Vegas	0	0	0	0	0	0	0
Total	11	0	156	0	0	0	0
Total Colorado River customer usage (CR + AR recovery)							
Big Bend (Laughlin)	4,423	4,345	4,339	4,399	4,413	4,449	4,485
Boulder City (b)	10,980	10,663	10,079	10,934	10,934	10,934	10,934
Henderson (b)	80,748	77,835	77,258	78,893	80,480	82,800	85,099
LVVWD (c)	292,656	283,514	278,579	275,421	277,568	285,391	293,008
North Las Vegas	51,203	50,270	48,260	48,400	48,592	48,992	49,490
Total	440,010	426,627	418,515	418,047	421,987	432,566	443,016
Total customer usage (GW + CR + AR recovery)							
Big Bend (Laughlin)	4,423	4,345	4,339	4,399	4,413	4,449	4,485
Boulder City (b)	10,980	10,663	10,079	10,934	10,934	10,934	10,934
Henderson (b)	80,748	77,835	77,258	78,893	80,480	82,800	85,099
LVVWD (c)	333,285	322,722	319,208	316,050	318,197	326,020	333,637
North Las Vegas	52,714	50,903	49,496	51,900	53,092	53,492	53,990
Total	482,150	466,468	460,380	462,176	467,116	477,695	488,145
NON-POTABLE (Wastewater Reuse)							
Customer usage							
Boulder City	226	195	146	172	172	172	172
CCWRD : Las Vegas Valley (d)	6,177	5,407	5,620	5,915	5,983	6,055	6,134
CCWRD : Laughlin	1	0	0	0	0	0	0
Henderson	7,431	6,775	6,268	6,000	6,000	6,000	6,000
Las Vegas (d)	4,582	4,790	4,688	5,000	5,000	5,000	5,000
North Las Vegas	0	0	0	0	0	750	1,500
Total	18,417	17,167	16,722	17,087	17,155	17,977	18,806
TOTAL POTABLE AND NON-POTABLE							
Customer usage (GW + CR + AR recovery + Wastewater Reuse)							
Big Bend (Laughlin)	4,423	4,345	4,339	4,399	4,413	4,449	4,485
Boulder City (b)	11,206	10,858	10,225	11,106	11,106	11,106	11,106
CCWRD : Las Vegas Valley (d)	6,177	5,407	5,620	5,915	5,983	6,055	6,134
CCWRD : Laughlin	1	0	0	0	0	0	0
Henderson (b)	88,179	84,610	83,526	84,893	86,480	88,800	91,099
Las Vegas (d)	4,582	4,790	4,688	5,000	5,000	5,000	5,000
LVVWD (c)	333,285	322,722	319,208	316,050	318,197	326,020	333,637
North Las Vegas	52,714	50,903	49,496	51,900	53,092	54,242	55,490
Total	500,567	483,635	477,102	479,263	484,271	495,672	506,951

NOTES

(a) Source(2009+): SNWA member.

(b) A portion of water usage is met with raw water used for irrigation.

(c) Includes banking operation recovery (e.g. water resource centers).

(d) CCWRD and LV provide sewer service to their service areas; both are in LVVWD's service area.

2012 SNWA Water Budget, November 15, 2012

TABLE 2: RESOURCES AVAILABLE, numbers in acre-feet per year

	----- Potable water resource -----								Total Long-term Resource (f)	Total Short-term Resource (g)
	----- Colorado River water -----				Total Colorado Riv. water	Ground- Water	Total Potable Resource	Non- Potable Resource (e)		
	Federal SNWS Water Delivery Contract (a)	SNWA Delivery Contract (b)	SNWA Delivery Contract (c)	Other Delivery Contracts (d)						
Big Bend	0	5,352	0.0	10,000	15,352.0	0	15,352.0	0	15,352.0	-
Boulder City	8,918	3,948	0.0	5,876	18,742.0	0	18,742.0	0	18,742.0	-
CCWRD (h)(i)	0	0	0.0	0	0.0	0	0.0	11,100	11,100.0	-
Henderson	27,021	19,858	2,137.5	15,878	64,894.5	0	64,894.5	7,500	72,394.5	-
Las Vegas (h)	0	0	0.0	0	0.0	0	0.0	2,000	2,000.0	-
LVVWD	232,426	78,799	362.5	15,407	326,994.5	40,629	367,623.5	0	367,623.5	-
N. Las Vegas	26,635	15,043	0.0	0	41,678.0	5,711	47,389.0	1,200	48,589.0	-
Total	295,000	123,000	2,500.0	47,161	467,661.0	46,340	514,001.0	21,800	535,801.0	(g)

NOTES

- (a) Contract 7-07-30-W0004 between SNWA and the Department of the Interior ("Federal SNWS Water Delivery Contract" or "SNWS Repayment and Delivery Contract"). Quantities for individual purveyors are outlined in Section 8(b) of the SNWA Cooperative Agreement.
- (b) In Contract 2-07-30-W0266 between SNWA and the Department of the Interior ("SNWA Water Delivery Contract"), Sections 4(a)(1) and (2) gives to SNWA the right to use any remaining, uncontracted Nevada apportionment and water available because of reduction, expiration or termination of individual entitlements within Nevada. Section 8 (c) of the SNWA Cooperative Agreement (amended January 1, 1996) apportions among the purveyors 123,000 AFY of Colorado River water made available to SNWA under Sections 4(a)(1) and (2).
- (c) As described in Section 8(d) of the SNWA Cooperative Agreement and in the Water Supply Agreement (formal agreement that transfers portion of BMI water to SNWA), 2,500 AFY of the transferred water is held in reserve by SNWA for Victory Valley (BMI land development company) projects. Once a specific project is proposed, the reserved water is transferred to the purveyor in whose service area the project is to be located; this transfer is effective upon the date that a service area "Purveyor Service Designation" letter is issued.
- (d) Other delivery contracts as follows: 2-07-30-W0269 (Big Bend), 14-06-300-978 (Boulder City), 0-07-30-W0246 (Henderson), 14-06-300-2130 (LVVWD).
- (e) Maximum 21,800 reuse per Cooperative Agreement, safeguards return flows to the Colorado River for return-flow credit. If reuse is greater than the reuse quantities outlined in the Agreement AND IF the excess reuse results in a reduction of return-flow credits which in turn reduces other purveyors' Colorado River water supplies, then the excess reuse quantity is reduced from the potable purveyor in whose service area the reuse provider resides.
- (f) Expected to be available in perpetuity.
- (g) Short-term resource includes: unused Colorado River apportionments, banked water as described in the SNWA's 2009 Water Resource Plan and flood control and domestic surplus Colorado River water made available to Nevada on a year-to-year basis by the Secretary of the Interior. Surplus Colorado River water includes Muddy and Virgin River Tributary Conservation Intentionally Created Surplus (ICS) credits and Coyote Spring Valley Groundwater Imported ICS.
- (h) Both Clark County Water Reclamation District (CCWRD) and Las Vegas (City of) sewer service areas are within LVVWD's water service area. If reuse demands for either CCWRD or Las Vegas are greater than the reuse in the SNWA Cooperative Agreement AND IF they reduce return flow credits which in turn reduces other purveyors' Colorado River water supplies, then the excess reuse quantity is subtracted from LVVWD's potable water resource.
- (i) Maximum reuse for CCWRD includes reuse for CCWRD in Laughlin and in the Las Vegas Valley.

2012 SNWA Water Budget, November 15, 2012

TABLE 3: FACILITY USAGE BY SNWA PURVEYOR, numbers in acre-feet per year (a)

	2009	2010	2011	2012	2013	2014	2015
Colorado River facility usage (includes artificial recharge, but no recovery of artificial recharge)							
Big Bend Water District	4,423	4,345	4,339	4,399	4,413	4,449	4,485
Boulder City							
SNWS	10,980	10,663	10,079	10,934	10,934	10,934	10,934
USBR (raw water) system	0	0	0	0	0	0	0
Total	10,980	10,663	10,079	10,934	10,934	10,934	10,934
Henderson							
SNWS	65,309	64,554	62,152	63,980	65,480	67,800	70,099
BMI system							
Potable	11,733	9,720	12,193	11,320	11,400	11,400	11,400
Raw	3,706	3,561	2,913	3,593	3,600	3,600	3,600
Total	15,439	13,281	15,106	14,913	15,000	15,000	15,000
Total	80,748	77,835	77,258	78,893	80,480	82,800	85,099
LVVWD (SNWS)							
Customer usage (no AR recovery)	292,645	283,514	278,423	275,421	277,568	285,391	293,008
Artificial recharge							
Current year banking operations (b)	625	499	531	0	0	0	0
Other (c)	(534)	8,293	2,761	0	0	0	0
Total Artificial recharge	91	8,792	3,292	0	0	0	0
Total	292,736	292,306	281,715	275,421	277,568	285,391	293,008
North Las Vegas (SNWS)							
Customer usage (no AR recovery)	51,203	50,270	48,260	48,400	48,592	48,992	49,490
Artificial recharge	0	0	0	0	0	0	0
Total	51,203	50,270	48,260	48,400	48,592	48,992	49,490
Total Colorado River purveyor usage							
Customer usage (no AR recovery)	439,999	426,627	418,359	418,047	421,987	432,566	443,016
Artificial recharge	91	8,792	3,292	0	0	0	0
Total	440,090	435,419	421,651	418,047	421,987	432,566	443,016
SNWS system loss to LVV (d)	3,484	3,254	3,056	4,600	4,644	4,765	4,885
Total Colorado River purveyor usage (including SNWS system loss)	443,574	438,673	424,707	422,647	426,631	437,331	447,901
Groundwater facility usage (includes recovery of artificial recharge)							
LVVWD							
Pumpage of groundwater rights	40,629	39,208	40,629	40,629	40,629	40,629	40,629
Pumpage of artificial recharge (recovery)							
Banking operations (e)	11	0	156	0	0	0	0
Recovery for purveyor members	0	0	0	0	0	0	0
Total pumpage of AR	11	0	156	0	0	0	0
Total	40,640	39,208	40,785	40,629	40,629	40,629	40,629
North Las Vegas							
Pumpage of groundwater rights	1,511	633	1,236	3,500	4,500	4,500	4,500
Total pumpage of AR	0	0	0	0	0	0	0
Total	1,511	633	1,236	3,500	4,500	4,500	4,500
Total groundwater facility usage	42,151	39,841	42,021	44,129	45,129	45,129	45,129

NOTES

- (a) Source(2009+): SNWA member.
- (b) Recharge recovered during current year for system management and water resource centers.
- (c) Recharge for SNWA purveyors and Groundwater Management Program.
- (d) Southern Nevada Water System system loss, see Appendix 4.
- (e) Recovery for system management and water resource centers. Excludes recovery by Las Vegas Paiutes.

2012 SNWA Water Budget, November 15, 2012

TABLE 4: USAGE BY FACILITY, numbers in acre-feet per year (a)

	2009	2010	2011	2012	2013	2014	2015
Usage by Colorado River facilities (includes artificial recharge, but no recovery of artificial recharge)							
Big Bend system	4,423	4,345	4,339	4,399	4,413	4,449	4,485
BMI system;							
Henderson	15,439	13,281	15,106	14,913	15,000	15,000	15,000
BMI Complex (b)	5,355	5,079	5,585	5,332	5,332	5,332	5,332
Total	20,794	18,360	20,691	20,245	20,332	20,332	20,332
BMI system loss (c)	488	564	690	508	510	510	510
Total BMI	21,282	18,924	21,381	20,753	20,842	20,842	20,842
Southern Nevada Water System (SNWS)							
Boulder City	10,980	10,663	10,079	10,934	10,934	10,934	10,934
Henderson	65,309	64,554	62,152	63,980	65,480	67,800	70,099
LVVWD	292,736	292,306	281,715	275,421	277,568	285,391	293,008
Nellis AFB (d)	1,672	1,371	1,129	1,250	1,250	1,250	1,250
North Las Vegas	51,203	50,270	48,260	48,400	48,592	48,992	49,490
Total	421,900	419,164	403,335	399,985	403,824	414,367	424,781
SNWS system loss (c)	3,484	3,254	3,056	4,600	4,644	4,765	4,885
Total SNWS	425,384	422,418	406,391	404,585	408,468	419,132	429,666
USBR (raw water) system							
Boulder City	0	0	0	0	0	0	0
Total Colorado River diversions by facility	451,089	445,687	432,111	429,737	433,723	444,423	454,993
Usage by groundwater facilities (includes AR recovery)							
SNWA purveyors (e)							
Pumpage of groundwater rights							
LVVWD	40,629	39,208	40,629	40,629	40,629	40,629	40,629
North Las Vegas	1,511	633	1,236	3,500	4,500	4,500	4,500
Total	42,140	39,841	41,865	44,129	45,129	45,129	45,129
Pumpage of AR (AR recovery)							
LVVWD	11	0	156	0	0	0	0
North Las Vegas	0	0	0	0	0	0	0
Total	11	0	156	0	0	0	0
Total SNWA pumpage	42,151	39,841	42,021	44,129	45,129	45,129	45,129
Las Vegas Valley groundwater pumpers							
Nellis AFB (f)	907	927	838	883	883	883	883
Private/permitted wells (f)	27,656	25,976	25,055	25,516	25,516	25,516	25,516
Total	28,563	26,903	25,893	26,399	26,399	26,399	26,399
Total pumpage of GW rights	70,703	66,744	67,758	70,528	71,528	71,528	71,528
Total pumpage of GW rights and pumpage of AR (AR recovery)	70,714	66,744	67,914	70,528	71,528	71,528	71,528

NOTES

- (a) Source(2009+): SNWA member.
- (b) Source(2009-2011): Final and Provisional Decree Accounting. Source(2012+): average 2010-2011.
- (c) Southern Nevada Water System and BMI System loss, see Appendix 4.
- (d) Source(2009-2011): Colorado River Commission. Source (2012+): average 2010-2011.
- (e) Total pumpage includes direct customer usage and recovery of artificial recharge.
- (f) Source(2009-2011): NV Division of Water Resources. Source(2012+): average 2010-2011.

2012 SNWA Water Budget, November 15, 2012

TABLE 5: SNWA PURVEYOR POTABLE USAGE (including artificial recharge) BY RESOURCE, numbers in acre-feet per year page 5

	2009	2010	2011	2012	2013	2014	2015	Resources Available
Purveyor potable usage (including artificial recharge) by resource								
Big Bend Water District								
Groundwater rights	0	0	0	0	0	0	0	0
Federal Delivery Contract (a)	0	0	0	0	0	0	0	0
SNWA Delivery Contract (b)	0	0	0	0	0	0	0	5,352
Other contracts	4,423	4,345	4,339	4,399	4,413	4,449	4,485	10,000
Short-term resource (c)	0	0	0	0	0	0	0	(c)
Total	4,423	4,345	4,339	4,399	4,413	4,449	4,485	
Boulder City								
Groundwater rights	0	0	0	0	0	0	0	0
Federal Delivery Contract (a)	8,918	8,918	8,918	8,918	8,918	8,918	8,918	8,918
SNWA Delivery Contract (b)	2,062	1,745	1,161	2,016	2,016	2,016	2,016	3,948
Other contracts (USBR)	0	0	0	0	0	0	0	5,876
Short-term resource (c)	0	0	0	0	0	0	0	(c)
Total	10,980	10,663	10,079	10,934	10,934	10,934	10,934	
Henderson								
Groundwater rights	0	0	0	0	0	0	0	0
Federal Delivery Contract (a)	27,021	27,021	27,021	27,021	27,021	27,021	27,021	27,021
SNWA Delivery Contract (b)	19,858	19,858	19,858	19,858	19,858	19,858	19,858	19,858
SNWA Delivery Contract (d)	2,138	2,138	2,138	2,138	2,138	2,138	2,138	2,138
Other contracts (BMI)	15,439	13,281	15,106	14,913	15,000	15,000	15,000	15,878
Short-term resource (c)	16,293	15,538	13,136	14,964	16,464	18,784	21,083	(c)
Total	80,748	77,835	77,258	78,893	80,480	82,800	85,099	
LVVWD (includes artificial recharge)								
Groundwater rights	40,629	39,208	40,629	40,629	40,629	40,629	40,629	40,629
Federal Delivery Contract (a)	232,426	232,426	232,426	232,426	232,426	232,426	232,426	232,426
SNWA Delivery Contract (b)	44,903	44,473	33,882	27,588	29,735	37,558	45,175	78,799
SNWA Delivery Contract (d)	0	0	0	0	0	0	0	363
Other contracts (15,407)	15,407	15,407	15,407	15,407	15,407	15,407	15,407	15,407
Short-term resource (c)	0	0	0	0	0	0	0	(c)
Total	333,365	331,514	322,344	316,050	318,197	326,020	333,637	
North Las Vegas (includes artificial recharge)								
Groundwater rights	1,511	633	1,236	3,500	4,500	4,500	4,500	5,711
Federal Delivery Contract (a)	26,635	26,635	26,635	26,635	26,635	26,635	26,635	26,635
SNWA Delivery Contract (b)	15,043	15,043	15,043	15,043	15,043	15,043	15,043	15,043
Other contracts	0	0	0	0	0	0	0	0
Short-term resource (c)	9,525	8,592	6,582	6,722	6,914	7,314	7,812	(c)
Total	52,714	50,903	49,496	51,900	53,092	53,492	53,990	
Total purveyor usage by water resource (includes artificial recharge)								
Groundwater	42,140	39,841	41,865	44,129	45,129	45,129	45,129	46,340
Colorado River water (includes artificial recharge)								
Federal Delivery Contract(a)	295,000	295,000	295,000	295,000	295,000	295,000	295,000	295,000
SNWA Delivery Contract (b)	81,866	81,119	69,944	64,505	66,652	74,475	82,092	123,000
SNWA Delivery Contract (d)	2,138	2,138	2,138	2,138	2,138	2,138	2,138	2,500
Other contracts	35,269	33,033	34,852	34,719	34,820	34,856	34,892	47,161
Short-term resource (c)	25,818	24,130	19,718	21,686	23,378	26,098	28,895	(c)
Total	440,090	435,419	421,651	418,047	421,987	432,566	443,016	
Total	482,230	475,260	463,516	462,176	467,116	477,695	488,145	

NOTES

- (a) Section 8(b) water in the SNWA Cooperative Agreement (295,000 AFY).
- (b) Section 8(c) water in the SNWA Cooperative Agreement. This estimate corresponds with Table 2.
- (c) Includes any Section 8(b) or 8(c) water that is unused by another individual SNWA purveyor; also includes "short-term resource" described in Table 2.
- (d) Section 8(d) water in the SNWA Cooperative Agreement.

2012 SNWA Water Budget, November 15, 2012

TABLE 6: WASTEWATER AND USE OF WASTEWATER, numbers in acre-feet per year (a)

Wastewater effluent	2009	2010	2011	2012	2013	2014	2015
Las Vegas Valley							
BMI Discharge (b)	3,915	3,783	4,392	4,082	4,082	4,082	4,082
City of Las Vegas (c)	72,217	72,063	57,034	46,900	47,100	47,400	47,600
CCWRD: Las Vegas Valley	105,955	104,754	106,867	107,810	109,050	110,359	111,794
Henderson	23,049	22,501	22,561	22,608	23,319	24,022	24,720
North Las Vegas (d)	0	0	9,816	18,676	18,676	18,676	18,676
Total	205,136	203,101	200,670	200,076	202,227	204,539	206,872
Boulder City							
CCWRD: Laughlin	1,525	1,418	1,227	1,276	1,276	1,276	1,276
Total (LVV + BC + Laughlin)	208,850	206,702	203,993	203,461	205,624	207,949	210,296
Use of wastewater effluent							
Las Vegas Valley							
Direct reuse (reclaimed water)							
City of Las Vegas	4,582	4,790	4,688	5,000	5,000	5,000	5,000
CCWRD: Las Vegas Valley	6,177	5,407	5,620	5,915	5,983	6,055	6,134
Henderson	7,431	6,775	6,268	6,000	6,000	6,000	6,000
North Las Vegas	0	0	0	0	0	750	1,500
Total	18,190	16,972	16,576	16,915	16,983	17,805	18,634
Disposal to groundwater							
City of Las Vegas	0	0	0	0	0	0	0
CCWRD: Las Vegas Valley	0	0	0	0	0	0	0
Henderson	1,237	1,258	1,878	1,500	1,500	1,500	1,500
North Las Vegas	0	0	0	0	0	0	0
Total	1,237	1,258	1,878	1,500	1,500	1,500	1,500
Returns to surface water							
BMI Discharge	3,915	3,783	4,392	4,082	4,082	4,082	4,082
City of Las Vegas (c)	67,635	67,273	52,346	41,900	42,100	42,400	42,600
CCWRD: Las Vegas Valley	99,778	99,347	101,247	101,895	103,067	104,304	105,660
Henderson	14,381	14,468	14,415	15,108	15,819	16,522	17,220
North Las Vegas (d)	0	0	9,816	18,676	18,676	17,926	17,176
Total	185,709	184,871	182,216	181,661	183,744	185,234	186,738
Boulder City (e)							
Direct reuse (reclaimed water)	226	195	146	172	172	172	172
Disposal to groundwater	1,299	1,223	1,081	1,104	1,104	1,104	1,104
Returns to surface water	0	0	0	0	0	0	0
CCWRD: Laughlin							
Direct reuse (reclaimed water)	1	0	0	0	0	0	0
Disposal to groundwater	0	0	0	0	0	0	0
Returns to surface water	2,188	2,183	2,096	2,109	2,121	2,134	2,148
Total direct reuse (reclaimed water)	18,417	17,167	16,722	17,087	17,155	17,977	18,806
Total Disposal to groundwater	2,536	2,481	2,959	2,604	2,604	2,604	2,604
Total returns to surface water	187,897	187,054	184,312	183,770	185,865	187,368	188,886
Wastewater used in return-flow credit calculation (returns to surface water + reuse) (f)							
Las Vegas Valley							
BMI Discharge	3,915	3,783	4,392	4,082	4,082	4,082	4,082
City of Las Vegas (c)	72,217	72,063	57,034	46,900	47,100	47,400	47,600
CCWRD: LVV	105,955	104,754	106,867	107,810	109,050	110,359	111,794
Henderson (g)	21,812	21,243	20,683	21,108	21,819	22,522	23,220
North Las Vegas (d)	0	0	9,816	18,676	18,676	18,676	18,676
Total	203,899	201,843	198,792	198,576	200,727	203,039	205,372

NOTES

- (a) Source(2009+): SNWA member.
- (b) Source(2009-2011): Colorado River Commission. Source(2012+): 77 % of use based on 2010-2011.
- (c) City of Las Vegas flows exclude dewatering flows to Las Vegas Wash at the Water Pollution Control Facility.
- (d) North Las Vegas began operating a wastewater treatment facility in 2011.
- (e) Boulder City does not return to surface water.
- (f) Consists of returns to surface water and direct reuse that could have been returned to surface water.
- (g) Includes Henderson direct reuse and returns to surface water.

2012 SNWA Water Budget, November 15, 2012

TABLE 7: WASTEWATER REUSE AND REUSE THRESHOLD, numbers in acre-feet per year (a)

	2009	2010	2011	2012	2013	2014	2015	Section 9 Threshold
1. Wastewater reuse by SNWA wastewater purveyor (a)								
Boulder City (b)	---	---	---	---	---	---	---	(b)
City of Las Vegas (c)	4,582	4,790	4,688	5,000	5,000	5,000	5,000	2,000
CCWRD:								
LVV (c)	6,177	5,407	5,620	5,915	5,983	6,055	6,134	10,550 (e)
Laughlin (d)	1	0	0	0	0	0	0	550 (e)
Total	6,178	5,407	5,620	5,915	5,983	6,055	6,134	11,100
Henderson	7,431	6,775	6,268	6,000	6,000	6,000	6,000	7,500
North Las Vegas	0	0	0	0	0	750	1,500	1,200
2. Wastewater reuse > Section 9(a) threshold (f)								
Boulder City (b)	---	---	---	---	---	---	---	(b)
City of Las Vegas	2,582	2,790	2,688	3,000	3,000	3,000	3,000	
CCWRD								
LVV	0	0	0	0	0	0	0	
Laughlin	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	
Henderson	0	0	0	0	0	0	0	
North Las Vegas	0	0	0	0	0	0	300	
3. If a purveyor reuses more than its 9(a) threshold, then its corresponding potable supply of 8(c) water (purveyor portion of 123,000 AFY) is reduced by an amount that will assure deliveries to other purveyors will not be less.(g)								
<p>Even though the reuse of some purveyors is projected to be greater than the quantified threshold, there is also projected to be potable water available such that all projected demands will be met. Therefore, no purveyor's potable supply has been reduced in the accompanying tables.</p>								

NOTES

- (a) Source(2009+): SNWA member.
- (b) Not applicable to Boulder City (Section 9c of SNWA Cooperative Agreement).
- (c) In the LVVWD service area, LVVWD is the water provider. City of Las Vegas and CCWRD are the sewer services and reuse providers. If the City of Las Vegas and CCWRD combined reuse is greater than its combined threshold AND the other purveyors' deliveries are less as a result, then LVVWD's Section 8(c) potable resource is reduced correspondingly.
- (d) In the Laughlin area, Big Bend Water District is the potable water provider and CCWRD is the sewer services and reuse provider. If CCWRD reuse is greater than its threshold AND the other purveyors' deliveries are less as a result, then Big Bend Water District's Section 8(c) potable resource is reduced correspondingly.
- (e) In the SNWA Cooperative Agreement, there are no individual thresholds for CCWRD - LVV and CCWRD - Laughlin. Thresholds in this table are agreed to for planning purposes to determine whether the amount over the threshold comes out of LVVWD or Big Bend Water District.
- (f) Source: Section 9 of the SNWA Cooperative Agreement.
- (g) Source: Section 9(b) of the SNWA Cooperative Agreement as follows: "If in any year a Member uses or authorizes the use of Reuse Water in excess of the amounts specified in sub article 9(a) [refers to the purveyor portions of 21,800], then the allocation made by or pursuant to sub article 8(c) [123,000 AFY] to the Purveyor Member that serves such Member shall be reduced by an amount that will assure that deliveries to the other Purveyor Members of water (i) allocated to such other Purveyor Members by or pursuant to this Agreement, or (ii) to which such other Purveyor Members have a right pursuant to separate contracts with the United States will not be less than they would have been in the absence of such excess use of Reuse Water." In other words, if excess reuse causes a reduction in return-flow credits, which in turn causes a reduction in other purveyor's Colorado River supplies, the excess reuse quantity is subtracted from the potable purveyor in whose service area the reuse provider resides.

2012 SNWA Water Budget, November 15, 2012

TABLE 8: COLORADO RIVER DIVERSIONS, RETURN FLOW CREDITS AND CONSUMPTIVE USE IN NEVADA, in acre-feet per year

Colorado River diversions	2009	2010	2011	2012	2013	2014	2015	Available Resources
SNWA Purveyor Members customer usage (includes recharge for current year banking operations) (a)								
Big Bend	4,423	4,345	4,339	4,399	4,413	4,449	4,485	
Boulder City	10,980	10,663	10,079	10,934	10,934	10,934	10,934	
Henderson	80,748	77,835	77,258	78,893	80,480	82,800	85,099	
LVVWD	293,270	284,013	278,954	275,421	277,568	285,391	293,008	
North Las Vegas	51,203	50,270	48,260	48,400	48,592	48,992	49,490	
Total	440,624	427,126	418,890	418,047	421,987	432,566	443,016	
SNWA Net Artificial Recharge (includes recharge for carryover banking operations and other recharge) (a) (l)								
LVVWD	(534)	8,293	2,761	0	0	0	0	
North Las Vegas	0	0	0	0	0	0	0	
Total	(534)	8,293	2,761	0	0	0	0	
SNWA Purveyor Members CR diversions (customer usage + artificial recharge)								
Big Bend	4,423	4,345	4,339	4,399	4,413	4,449	4,485	
Boulder City	10,980	10,663	10,079	10,934	10,934	10,934	10,934	
Henderson	80,748	77,835	77,258	78,893	80,480	82,800	85,099	
LVVWD	292,736	292,306	281,715	275,421	277,568	285,391	293,008	
North Las Vegas	51,203	50,270	48,260	48,400	48,592	48,992	49,490	
Total	440,090	435,419	421,651	418,047	421,987	432,566	443,016	
Usage (customer + AR)	440,090	435,419	421,651	418,047	421,987	432,566	443,016	
Total System Loss (b)	3,972	3,818	3,746	5,108	5,154	5,275	5,395	
TOTAL	444,062	439,237	425,397	423,155	427,141	437,841	448,411	
Other Colorado River Users (c) (d)								
BMI Complex (e)	5,355	5,079	5,585	5,332	5,332	5,332	5,332	8,208
Fort Mohave Indian Res. (e)	4,855	4,231	4,738	4,485	4,485	4,485	4,485	12,534
Nellis AFB (e)	1,672	1,371	1,129	1,250	1,250	1,250	1,250	4,000
LMNRA at Lake Mead (e) (f)	531	456	431	444	444	444	444	2,000
LMNRA at Lake Mohave (e) (f)	181	162	189	176	176	176	176	
Pabco (e)	678	586	607	597	597	597	597	928
Secretarial Reservation (e)	50	65	40	53	53	53	53	300
Southern Cal. Edison	520	370	97	0	0	0	0	(g)
Nev. Division of Wildlife (e) (h)	61	234	220	227	227	227	227	
Small water users (e)	0	2	4	3	3	3	3	
TOTAL	13,903	12,556	13,040	12,565	12,565	12,565	12,565	
Total Nevada diversions	457,965	451,793	438,437	435,720	439,706	450,406	460,976	
Nevada Return flow credits								
Las Vegas Valley (c) (i)	205,467	206,508	211,693	200,633	202,900	204,786	206,681	
Laughlin (a) (c)	2,188	2,183	2,096	2,109	2,121	2,134	2,148	
Secretarial Reservation (c) (e)	40	42	28	37	37	37	37	
Nev. Division of Wildlife (c) (h)	52	224	208	216	216	216	216	
Unmeasured Returns (c) (j)	1,603	1,397	1,563	1,495	1,495	1,495	1,495	
TOTAL	209,350	210,354	215,588	204,490	206,769	208,668	210,577	
Nevada Consumptive use								
Consumptive use with AR (k)	248,615	241,439	222,849	231,229	232,936	241,737	250,398	
Net Artificial Recharge (l)	(534)	8,293	2,761	0	0	0	0	
Consumptive use no AR	249,149	233,146	220,088	231,229	232,936	241,737	250,398	

NOTES

- (a) Source: SNWA members, see Table 3 and Table 6.
- (b) From Appendix 4.
- (c) Source(2009-2011): Bureau of Reclamation accounting.
- (d) Available resource assumed as consumptive use.
- (e) Source(2012+): average 2010 to 2011.
- (f) Lake Mead National Recreation Area (LMNRA).
- (g) Terminated water supply agreement in 2011.
- (h) Available resource is a consumptive use amount of 25 AFY.
- (i) Source(2012+): Appendix 1, line 18.
- (j) Source(2012+): one-third of Ft. Mojave Indian Res. use above.
- (k) Excludes interstate banking.
- (l) Total recharge less recovery, excludes in-lieu recharge.

2012 SNWA Water Budget, November 15, 2012

APPENDIX I: RETURN FLOW CREDITS (U.S. Bureau of Reclamation method) AND NEVADA CONSUMPTIVE USE CALCULATIONS ADJUSTED FOR ICS AND INTERSTATE BANKING, numbers in acre-feet per year

CALCULATION OF DIVERSIONS AND RETURN FLOW CREDITS

	2009	2010	2011	2012	2013	2014	2015
ABOVE HOOVER DAM							
1. Total Colorado River Water Diverted Above Hoover Dam	447,886	442,863	429,070	426,658	430,630	441,294	451,828
2. Gauged Flow of Las Vegas Wash below Lake Las Vegas (USGS Station No. 09419800)	205,377	215,501	213,778	205,011	207,278	209,164	211,059
3. Precipitation Runoff (Estimated)	1,910	9,993	3,085	5,378	5,378	5,378	5,378
4. Imported Groundwater and Surface Water	0	0	0	0	0	0	0
5. 2% of Imported Groundwater and Surface Water	0	0	0	0	0	0	0
6. Effluent Reaching LM From the LV Valley M&I Groundwater Pumping (a)	0	0	0	0	0	0	0
7. Total Las Vegas Wash Adjusted Gauge Flow (2-3-5-6)	204,467	205,508	210,893	199,633	201,900	203,786	205,681
8. Total Other Nevada Flow to Lake Mead Above Hoover Dam	92	266	236	253	253	253	253
9. Colorado River Bypassing Gauge, less Phreatophyte Use below Gauge (*)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
10. Total Flow to Colorado River Above Hoover Dam (7+8+9)	205,559	206,774	211,929	200,886	203,153	205,039	206,934
11. Consumptive Use Above Hoover Dam (1-10)	242,427	235,609	217,141	225,772	227,477	236,255	244,864
BELOW HOOVER DAM							
12. Total Colorado River Water Diverted Below Hoover Dam	9,979	9,110	9,367	9,062	9,076	9,112	9,148
13. Total Flow to Colorado River Below Hoover Dam	3,781	3,580	3,659	3,604	3,616	3,629	3,643
14. Consumptive Use Below Hoover Dam (12-13)	5,188	5,530	5,708	5,458	5,460	5,483	5,505
SUMMARY							
15. Total Nevada Diversions from Colorado River (1+12)	457,865	451,793	438,437	435,720	439,706	450,406	460,976
16. Total Nevada Return Flow Credit (10+13)	209,350	210,354	215,588	204,460	206,789	208,668	210,577
17. Total Nevada Consumptive Use Before Interstate Banking (15-16) (b)	248,615	241,439	222,849	231,229	232,936	241,737	250,398
18. Total Las Vegas Valley Return Flow Credit (7+9)	205,467	206,508	211,693	200,633	202,900	204,786	206,681
NEVADA CONSUMPTIVE USE CALCULATIONS ADJUSTED FOR ICS AND INTERSTATE BANKING							
19. Nevada Basic Apportionment	300,000	300,000	300,000	300,000	300,000	300,000	300,000
20. Total Volume of ICS Created (b)	25,426	29,365	32,098	32,700	29,300	25,800	14,900
21. Overrun Payback	5,016	0	0	0	0	0	0
22. ICS Delivery	0	0	0	1,000	0	0	0
23. ICS volume banked on Lake Mead (20-21-22)	(20,410)	(29,365)	(32,098)	(31,700)	(29,300)	(25,800)	(14,900)
24. Resources available for Consumptive Use (19+20-21+23)	300,000	300,000	300,000	301,000	300,000	300,000	300,000
25. Total Nevada Consumptive Use (c)	248,615	241,439	222,849	231,229	232,936	241,737	250,398
26. Resources available for Interstate Banking / Colorado River System Benefit	51,385	58,561	77,151	69,771	67,064	56,263	49,602
27. Nevada Underrun/(Overrun) (24-25-26) (c)	0	0	0	0	0	0	0

NEVADA CONSUMPTIVE USE CALCULATIONS ADJUSTED FOR ICS AND INTERSTATE BANKING

19. Nevada Basic Apportionment	300,000	300,000	300,000	300,000	300,000	300,000	300,000
20. Total Volume of ICS Created (b)	25,426	29,365	32,098	32,700	29,300	25,800	14,900
21. Overrun Payback	5,016	0	0	0	0	0	0
22. ICS Delivery	0	0	0	1,000	0	0	0
23. ICS volume banked on Lake Mead (20-21-22)	(20,410)	(29,365)	(32,098)	(31,700)	(29,300)	(25,800)	(14,900)
24. Resources available for Consumptive Use (19+20-21+23)	300,000	300,000	300,000	301,000	300,000	300,000	300,000
25. Total Nevada Consumptive Use (c)	248,615	241,439	222,849	231,229	232,936	241,737	250,398
26. Resources available for Interstate Banking / Colorado River System Benefit	51,385	58,561	77,151	69,771	67,064	56,263	49,602
27. Nevada Underrun/(Overrun) (24-25-26) (c)	0	0	0	0	0	0	0

NOTES

- (a) If Las Vegas Valley M&I Groundwater rights exceed 47,340, then lines 6 and 9 above will be recalculated based on the method approved by the USBR as referenced in a letter dated December 5, 2007.
- (b) Total Verified Tributary Conservation ICS and Imported ICS after 5 percent deduction for system benefit.
- (c) Subject to final USBR accounting.

2012 SANWA Water Budget, November 15, 2012

APPENDIX 2. PROJECTION OF ACCRUALS AND GAUGE FLOWS (used in calculation of return flow credits), numbers in acre-feet per year

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011		
1. Estimate accruals																							
(Accruals = Gauge Flows - Effluent to Wash - Stormwater)																							
a. Measured Wash flow at gauge (a)	133,203	139,765	133,576	132,099	143,486	146,017	170,514	170,326	170,585	169,246	173,235	173,302	193,412	203,195	218,115	219,973	213,163	208,606	206,377	215,591	215,776		
b. Effluent to Wash (b)	(102,844)	(106,404)	(113,750)	(123,040)	(127,434)	(132,245)	(143,025)	(145,778)	(149,781)	(155,174)	(159,337)	(160,811)	(166,754)	(177,313)	(186,469)	(187,816)	(195,669)	(197,791)	(198,758)	(200,000)	(201,591)	(203,776)	
c. Stormwater (c)	(1,065)	(9,840)	(4,126)	(2,155)	(3,586)	(1,129)	(6,886)	(11,377)	(5,402)	(2,745)	(2,052)	(1,410)	(7,049)	(14,377)	(15,389)	(11,781)	(2,329)	(1,678)	(1,910)	(9,893)	(9,893)	(13,006)	
d. Total (accruals) (d)	19,294	23,722	15,700	6,904	12,166	12,343	18,793	13,202	15,399	2,326	10,830	11,081	18,609	11,506	16,278	30,385	21,765	17,140	18,758	20,637	28,477		
2. Calculate ratio of accruals/LVV customer usage																							
a. Accruals	19,294	23,722	15,700	6,904	12,166	12,343	18,793	13,202	15,399	2,326	10,830	11,081	18,609	11,506	16,278	30,385	21,765	17,140	18,758	20,637	28,477		
b. Total LVV customer usage (b)	315,198	321,169	342,617	373,398	377,699	413,741	415,092	412,450	452,638	480,852	503,877	519,685	497,736	490,346	499,109	532,335	540,446	515,624	502,337	484,813	478,569		
1. LVV customer usage (c)	3,244	3,104	2,293	2,208	2,452	4,722	11,066	4,238	5,675	6,287	1,744	11,648	2,593	8,850	12,613	6,869	5,330	9,001	3,664	3,294	3,082		
2. SWS system loss	319,442	326,292	345,110	376,802	380,151	418,119	428,148	417,188	459,314	486,830	505,721	531,333	503,316	489,739	491,982	529,394	545,179	521,623	505,921	488,067	481,625		
3. Total	6.05%	7.27%	4.53%	1.84%	3.20%	2.85%	4.41%	3.16%	3.39%	5.48%	2.16%	2.09%	3.32%	2.30%	3.18%	5.94%	5.99%	3.29%	2.71%	4.23%	5.91%		
e. Accruals/Total LVV usage (%)	3.71%																						
3. Calculate median accruals/Total LVV usage (e)																							
4. Project future accruals																							
a. Total LVV usage (b)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011		
1. LVV usage (d)	479,624	484,739	495,293	505,707	510,000	514,293	518,586	522,879	527,172	531,465	535,758	540,051	544,344	548,637	552,930	557,223	561,516	565,809	570,102	574,395	578,688		
2. SWS system loss	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000		
3. Total	480,624	485,739	496,293	506,707	511,000	515,293	519,586	523,879	528,172	532,465	536,758	541,051	545,344	549,637	553,930	558,223	562,516	566,809	571,102	575,395	579,688		
3.71% * Total LVV usage	17,872	18,159	18,552	18,945	19,338	19,731	20,124	20,517	20,910	21,303	21,696	22,089	22,482	22,875	23,268	23,661	24,054	24,447	24,840	25,233	25,626		
5. Project future gauge flows (Gauge flows = Effluent to Wash + Stormwater + Accruals)																							
a. Effluent to Wash (b)	181,661	183,744	185,827	187,910	190,000	192,083	194,166	196,249	198,332	200,415	202,498	204,581	206,664	208,747	210,830	212,913	214,996	217,079	219,162	221,245	223,328		
b. Stormwater (average of 1981 - 2011)	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378	5,378		
c. Accruals	17,872	18,159	18,552	18,945	19,338	19,731	20,124	20,517	20,910	21,303	21,696	22,089	22,482	22,875	23,268	23,661	24,054	24,447	24,840	25,233	25,626		
d. Estimated Wash flows at gauge	205,011	207,278	209,545	211,812	214,079	216,346	218,613	220,880	223,147	225,414	227,681	229,948	232,215	234,482	236,749	239,016	241,283	243,550	245,817	248,084	250,351		
5. Measured and estimated gauge flows	181,661	183,744	185,827	187,910	190,000	192,083	194,166	196,249	198,332	200,415	202,498	204,581	206,664	208,747	210,830	212,913	214,996	217,079	219,162	221,245	223,328		
(a) Source (1981 - 2001) U.S. Geological Survey, "Water Resources Data Nevada" Source (2002-2011), data reflected in the Year End Return Flow Credit Data (Colorado River Commission).																							
(b) From Appendix 3.																							
(c) Accruals calculations and projections adjusted to correspond with Las Vegas Valley Return Flow Methodology adopted December 5, 2007.																							
(d) Includes recovery of artificial recharge (AR recovery)																							
(e) Median corresponds with the period 2003-2011, and the establishment of the current location of the page at Las Vegas Wash below Lake Las Vegas on June 28, 2002.																							

NOTES: (a) Source (1981 - 2001) U.S. Geological Survey, "Water Resources Data Nevada" Source (2002-2011), data reflected in the Year End Return Flow Credit Data (Colorado River Commission).

(b) From Appendix 3.

(c) Accruals calculations and projections adjusted to correspond with Las Vegas Valley Return Flow Methodology adopted December 5, 2007.

(d) Includes recovery of artificial recharge (AR recovery)

(e) Median corresponds with the period 2003-2011, and the establishment of the current location of the page at Las Vegas Wash below Lake Las Vegas on June 28, 2002.

2012 SNWA Water Budget, November 15, 2012

APPENDIX 3 - LAS VEGAS VALLEY WATER USAGE AND WASTEWATER FLOWS (used in calculation of return flow credits), numbers in acre-feet per year

	1981	1982	1983	1984	1985	1986	1987	1988	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Resources Available
Las Vegas Valley customer usage																										
Colorado River customer diversion (no AR, no AR recovery)(a)																										
SNWA Purveyor Members	33,161	34,288	35,071	42,083	42,676	52,247	48,962	55,256	63,305	67,248	73,632	79,167	73,833	74,985	76,039	83,401	85,576	79,841	80,748	77,885	77,259	78,839	80,803	83,860	86,088	
LVAH/MSD	27,753	27,913	28,073	23,286	23,062	344,834	249,210	243,140	27,748	294,109	304,368	313,081	287,111	288,216	305,349	320,485	319,644	304,045	292,645	283,514	278,423	275,421	277,588	285,391	283,008	
North Las Vegas	231,783	245,733	255,918	250,834	267,802	325,984	328,718	330,347	371,843	389,335	417,630	433,542	414,828	407,675	428,777	455,502	461,032	437,624	424,586	411,618	403,341	402,714	405,840	417,183	427,597	
Other Las Vegas Valley Users	5,738	6,302	6,021	6,486	5,064	4,988	6,730	6,339	5,480	5,286	5,210	5,332	5,951	5,861	5,820	6,184	5,698	5,648	5,355	5,078	5,685	5,332	5,132	5,332	5,332	
BIM Complex (b)	2,587	2,817	2,861	3,163	3,015	3,251	2,791	2,555	2,248	2,206	1,760	2,172	1,893	1,787	2,271	2,118	2,073	2,107	1,872	1,371	1,129	1,250	1,260	1,232	1,232	
Nellis AFB (b)	3,151	3,485	3,160	3,323	2,049	1,737	3,939	3,584	3,238	3,080	3,450	3,160	4,058	4,074	3,549	4,073	3,581	3,541	3,483	3,707	3,556	3,182	3,172	3,100	3,100	
Total	3,344	3,528	2,895	2,694	2,916	5,285	11,562	4,738	5,783	6,795	2,184	11,825	2,721	9,144	13,275	7,067	5,831	6,106	3,972	3,818	3,746	5,108	5,154	5,275	5,395	
Total	255,374	258,379	278,346	307,207	308,077	343,128	350,752	344,146	385,443	413,812	426,791	453,149	424,874	424,467	450,143	471,871	475,432	451,245	435,985	421,887	414,401	414,404	418,378	428,040	438,574	
Pumpage of Artificial Recharge Recovery (c)																										
SNWA Purveyor Members	0	0	0	0	2,473	1,586	164	0	0	0	0	484	1,092	1	265	0	0	0	0	0	0	0	0	0	0	0
LVAH/MSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Las Vegas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2,473	1,586	164	0	0	0	0	484	1,092	1	265	0	0	0	0	0	0	0	0	0	0	0
Groundwater Usage																										
SNWA Purveyor Members (d)	36,653	36,785	35,647	37,907	40,247	39,847	40,152	39,857	39,028	38,255	40,126	40,126	40,126	40,612	37,851	35,645	40,829	40,636	40,626	36,208	40,620	40,620	40,620	40,620	40,628	
LVAH/MSD	4,312	4,240	4,594	2,589	3,345	5,669	5,614	5,637	4,135	5,226	5,449	5,686	4,678	2,388	1,684	1,355	748	1,225	1,511	633	1,236	3,500	4,500	4,500	4,500	
North Las Vegas	40,885	44,025	40,241	40,476	41,562	43,616	45,766	45,544	43,163	43,481	45,575	45,712	45,004	43,010	33,355	37,200	41,271	42,354	42,140	38,841	41,855	44,129	45,129	45,129	45,129	
Other Las Vegas Valley Users	1,467	935	978	920	815	1,019	1,144	1,005	1,530	2,088	2,367	2,208	1,865	1,816	1,745	1,451	1,958	1,857	1,907	927	838	883	883	883	883	
Nellis AFB (b)	20,636	23,377	26,137	27,477	25,658	27,677	28,778	26,690	28,266	25,041	30,041	29,351	28,513	29,932	27,644	25,180	27,395	27,748	26,588	25,978	25,985	25,516	25,516	25,516	25,516	
Private/Permitted Wells (d)	22,103	24,312	27,115	28,387	26,473	25,695	26,822	27,485	28,786	30,124	33,308	31,552	30,628	31,748	28,886	30,331	28,164	28,148	26,588	26,093	25,883	26,388	26,388	26,388	26,388	
Total	63,068	68,337	67,356	68,872	70,085	74,312	75,966	73,038	72,859	73,605	78,883	77,209	75,472	74,758	62,241	67,531	70,542	70,503	70,703	66,744	67,759	70,528	71,528	71,528	71,528	
Las Vegas Valley Total Usage (includes recovery)	318,442	326,716	345,702	376,090	380,615	419,035	426,644	417,188	458,402	487,417	506,171	531,510	500,447	499,480	512,384	539,402	548,277	521,790	506,309	486,631	482,315	484,932	484,904	500,588	511,102	
Las Vegas Valley Total Usage (includes recovery)	315,168	323,188	342,817	373,386	377,869	413,741	415,082	412,450	452,639	480,652	503,977	519,685	487,286	480,346	499,109	532,335	540,445	515,624	502,337	484,813	478,560	478,824	484,750	485,293	505,707	
LW wastewater flow to Wash																										
Influent (e)	105,778	111,452	118,748	126,824	135,637	142,188	154,001	156,074	164,750	173,371	177,543	182,802	191,165	200,460	210,945	213,164	215,138	211,547	203,660	201,843	198,792	198,576	200,727	203,039	205,372	
Reuse (f)	2,934	5,048	4,688	6,764	6,943	6,944	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
Effluent to Wash (influent - effluent)	102,844	106,404	114,060	120,060	128,694	135,244	149,001	151,074	159,750	168,371	172,543	177,802	186,165	195,460	205,945	208,164	210,138	206,547	198,660	196,843	193,792	193,576	195,727	198,039	200,372	

NOTES:
 (a) Sources (1981 - 2011): actual. Sources (2012-): SNWA Purveyor Member.
 (b) Sources (1981 - 2011): actual. Sources (2012-): SNWA Purveyor Member.
 (c) Includes recovery for banking operations and for purveyor members.
 (d) Sources (1981 - 2011): Nevada Division of Water Resources. Sources (2012-): Table 4.
 (e) Includes Henderson returns to the Colorado River, Henderson reuse, and BIM discharge to the wash beginning in 1994.
 (f) Includes Henderson reuse beginning in 1984.

2012 SNWA Water Budget, November 15, 2012

APPENDIX 4. COLORADO RIVER USAGE (CUSTOMER + AR) BY SYSTEM AND ESTIMATES OF SNWS SYSTEM LOSS, numbers in acre-feet per year

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Colorado River diversion by system (includes AR, but no AR recovery)																										
Big Bend/Water District	4,127	4,343	4,423	4,833	5,336	5,315	5,034	4,970	5,162	5,232	5,268	5,225	5,315	4,822	4,639	4,914	4,653	4,433	4,423	4,945	4,339	4,399	4,413	4,448	4,485	
Bozler City	6,363	6,638	7,051	7,325	7,327	6,998	7,708	7,670	8,658	10,618	10,168	13,346	12,564	11,013	10,130	11,406	11,302	11,368	10,980	10,893	10,079	10,934	10,934	10,934	10,934	
USBR system	0	3	157	246	280	279	171	132	178	223	434	850	23	23	23	23	23	23	23	23	23	23	23	23	23	
Total	6,647	7,206	7,571	7,607																						
Henderson																										
SNWS	28,129	28,699	29,870	29,467	28,405	35,969	40,973	40,973	51,691	53,484	61,493	66,156	64,100	61,017	63,468	66,616	71,326	63,278	65,309	64,554	62,152	63,980	65,480	67,400	70,089	
BM System	5,052	10,580	6,201	12,566	13,366	15,842	13,013	14,263	11,614	13,754	12,338	13,028	9,133	12,969	12,570	14,783	14,250	16,362	15,438	13,281	15,106	14,913	15,000	15,000	15,000	
Total	33,181	39,279	36,071	42,033	42,271	51,811	54,986	55,236	63,305	67,238	73,831	79,184	73,233	74,988	76,038	81,399	85,576	79,641	80,747	77,835	77,085	78,983	80,480	82,400	85,089	
LVMWD (SNWS)																										
North Las Vegas (SNWS)	202,495	204,527	234,039	243,418	240,243	258,628	267,081	279,286	304,810	303,830	325,637	315,345	325,651	305,332	321,217	340,471	337,638	309,880	292,738	292,306	281,715	275,421	277,568	285,361	293,008	
Total	24,184	23,917	23,937	21,283	33,215	33,982	32,981	32,568	35,169	35,262	39,537	41,264	44,151	46,473	47,389	52,606	55,812	52,438	51,203	50,270	48,360	48,400	48,592	48,892	49,480	
Systems with multiple users (BM) System:																										
Henderson	5,052	10,580	6,201	12,566	13,366	15,842	13,013	14,263	11,614	13,754	12,338	13,028	9,133	12,969	12,570	14,783	14,250	16,362	15,438	13,281	15,106	14,913	15,000	15,000	15,000	
BM Complex	5,738	6,302	6,021	6,466	5,084	4,986	6,730	9,339	5,469	5,288	5,210	5,372	5,332	5,851	5,820	6,184	6,696	5,648	5,355	5,079	5,565	5,332	5,332	5,332	5,332	
Total	10,791	16,882	12,222	19,032	18,450	20,830	19,743	23,602	17,103	19,042	17,548	18,401	15,865	18,830	18,390	20,967	20,946	22,310	20,784	18,360	20,681	20,245	20,332	20,332	20,332	
Southern Nevada Water System (at turnouts)																										
Bozler City	6,363	6,638	7,051	7,325	7,327	6,998	7,708	7,670	8,658	10,618	10,168	13,346	12,564	11,013	10,130	11,406	11,302	11,368	10,980	10,893	10,079	10,934	10,934	10,934	10,934	
LVMWD	26,729	27,699	24,670	25,467	25,280	25,408	25,989	40,973	51,691	53,484	61,493	66,156	64,100	61,017	63,468	66,616	71,326	63,278	65,309	64,554	62,152	63,980	65,480	67,400	70,089	
USBR	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	3,018	
Total	36,110	37,355	34,739	35,810	35,625	35,424	36,715	52,669	66,400	70,510	74,669	82,520	77,652	75,049	76,916	81,452	82,644	77,654	76,207	74,353	72,175	77,932	79,352	81,352	84,031	
North Las Vegas																										
Total	263,789	267,585	292,827	314,836	313,180	339,505	348,120	354,022	403,796	425,406	438,565	438,323	449,149	424,922	444,476	475,216	478,972	439,183	431,600	419,184	403,333	399,685	403,824	414,367	424,781	
Estimate of (BM) system loss																										
1. BM diversions at intake (b)	10,880	16,879	14,814	16,615	16,465	20,630	18,743	20,622	17,191	18,353	17,869	16,578	15,193	19,024	18,399	21,065	20,447	22,475	21,262	18,924	21,341	20,245	20,332	20,332	20,332	
2. BM diversions at turnout	10,781	16,822	14,222	16,654	16,409	20,330	18,725	20,522	17,192	18,050	17,850	16,501	15,005	18,830	18,396	20,967	19,626	22,310	20,794	18,924	20,681	20,245	20,332	20,332	20,332	
3. System loss (intake-turnout)(c)	-131	-13	592	-447	6	0	0	0	0	80	-687	450	177	184	3	89	501	165	498	564	690	489	564	564	564	
4. System loss percentage (d)	(c)	(c)	4.16%	(e)	(e)	(e)	(e)	(e)	(e)	0.51%	(c)	2.56%	0.95%	1.05%	(c)	0.47%	2.51%	0.74%	2.35%	3.07%	3.33%	2.51%	2.51%	2.51%	2.51%	
5. Median of reasonable system loss (e)(c)																										
6. Realistic unreasonable system loss figures and project (f)																										
(f) 2.51% * BM (div at turnout)	271	424	582	478	464	523	466	516	86	479	450	177	128	184	462	89	501	165	488	564	690	489	564	564	564	
Estimate of SNWS system loss																										
1. SNWS diversions at intake (b)	263,789	264,702	295,120	316,892	316,632	343,337	357,186	353,087	408,471	424,885	440,339	450,171	450,742	433,572	457,296	482,168	464,302	445,184	425,384	422,418	408,391	403,824	414,367	424,781	439,391	
2. SNWS diversions at turnout	263,789	264,588	292,827	314,866	313,180	339,505	348,120	354,022	403,796	425,406	438,565	438,323	449,149	424,922	444,476	475,216	478,972	439,183	431,600	419,184	403,333	399,685	403,824	414,367	424,781	
3. System loss (intake-turnout)(c)	19	3,104	-2,393	2,026	2,452	4,772	11,066	(985)	3,675	6,207	1,774	11,844	2,393	6,850	12,813	9,989	5,330	6,001	3,484	3,254	3,096	3,096	3,096	3,096	3,096	
4. System loss percentage (d)	(c)	1.16%	0.78%	0.70%	0.78%	1.41%	3.20%	(c)	1.41%	1.47%	0.40%	2.68%	0.56%	2.11%	2.89%	1.47%	1.11%	1.37%	0.83%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	
5. Median of reasonable system loss (e)(c)																										
6. Realistic unreasonable system loss figures and project (f)																										
(f) 1.15% * SNWS (at all turnout)	3,244	3,104	2,393	2,026	2,452	4,772	11,066	4,738	5,675	6,207	1,744	11,844	2,393	6,850	12,813	9,989	5,330	6,001	3,484	3,254	3,096	3,096	3,096	3,096	3,096	
Estimate of Total system loss	3,515	3,528	2,885	2,884	2,916	5,385	11,592	5,256	5,763	6,765	2,194	11,925	2,721	9,144	13,275	7,067	5,831	6,168	5,972	3,618	3,746	5,108	5,154	5,275	5,385	

NOTES
 (a) Includes antilock recharge (AR) which is part of the Colorado River diversion; does not include recovery of antilock recharge (AR recovery) which is not a diversion.
 (b) Source: "Colorado River Water Diversion for Use in Southern Nevada - CRIC Internal spreadsheet."
 (c) System loss is estimated by subtracting turnout meter reading from intake meter reading. Because of meter imprecision, system loss figures are sometimes unreasonable, i.e., negative numbers or very small numbers.

SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
November 15, 2012

Subject: SNWS Operating Plan	Director's Backup
Petitioner: Ronald E. Zegers, Deputy General Manager, Engineering/Operations	
Recommendations: That the Board of Directors adopt the Southern Nevada Water System Operating Plan.	

Fiscal Impact:

None by approval of the above recommendation.

Background:

The Southern Nevada Water System (SNWS) Facilities and Operations Agreement between the Authority and its water purveyor members requires the Authority to adopt an Operating Plan (Plan) annually for the SNWS. The attached Plan for the period of January 1, 2013, through December 31, 2015, represents the joint effort of the water purveyors and SNWS operating staff.

The Plan is designed to establish key operational parameters for the SNWS that will meet the purveyor's water needs. The Plan includes, on a monthly basis, the maximum and average daily flows requested by the purveyors to be delivered at their respective turnouts, target levels of chlorine, and target hydraulic grade lines.

The Plan has been reviewed and approved by the SNWS Work Group.

This action is authorized pursuant to Section 3.1 of the Authority's 2012 Amended Facilities and Operations Agreement. The office of the General Counsel has reviewed and approved this agenda item.

Respectfully submitted:



Patricia Mulroy, General Manager
PM:REZ:MRJ:GEN:VK:dc
Attachment

AGENDA ITEM #	7
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ANNUAL OPERATING PLAN FOR THE SOUTHERN NEVADA WATER SYSTEM

The Annual Operating Plan for the Southern Nevada Water System (SNWS) covers the period of **January 1, 2013** through **December 31, 2015**. This Plan represents the purveyors' best estimate of projected water demands for the duration of the Plan. The Southern Nevada Water Authority expects to be able to supply water to meet these purveyor demands at the desired chlorine residuals.

MAXIMUM AND AVERAGE FLOWS

The enclosed tabulations present the maximum and average daily flows requested by the water users by month for the calendar years **2013**, **2014**, and **2015**. The maximum and average daily flows requested are within the capacity of the system.

CHLORINE CONCENTRATIONS

Also included in the tabulations are the purveyors' requested chlorine concentrations for each turnout. The Southern Nevada Water Authority expects to meet the purveyor requested chlorine residuals at all the turnouts.

HYDRAULIC GRADE LINES

The tabulations also include the hydraulic grade lines requested by the water users for the water deliveries. Results of hydraulic modeling indicate that these hydraulic grade lines can be met during delivery of the projected water demands.

CURRENT AND FUTURE SYSTEM CAPACITY

The current maximum treatment capacity of the Alfred Merritt Smith Water Treatment Facility (AMSWTF) is 600 million gallons per day (MGD). The River Mountains Water Treatment Facility (RMWTF) expansion to 400 MGD is complete and operational, creating a combined treatment capacity for the SNWS of 1,000 MGD. The high lift pumping system that delivers potable water from AMSWTF has a nominal capacity of 580 MGD. The River Mountains Pumping Station that delivers potable water from RMWTF has a nominal capacity of 300 MGD, creating a combined potable water delivery to the Las Vegas Valley of 880 MGD. Pumping Station 1A that delivers potable water from AMSWTF to Boulder City has a nominal capacity of 20 MGD.

2013 - 2015 Annual Water Flow Projections

SUMMARY

MONTH	LVVWD		COH		NLV		BC		NELLIS		TOTAL	
	Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Jan	190	209	36	54	31	38	4.4	11.3	0.9	1.7	261.8	314.1
Feb	193	214	37	58	32	41	4.2	10.5	1.1	2.3	267.3	325.3
Mar	236	269	45	65	37	48	7.4	12.3	1.7	2.3	326.6	396.3
Apr	267	302	50	72	38	49	9.8	17.5	1.8	2.4	366.6	442.8
May	329	365	67	90	45	55	12.0	16.2	2.0	2.8	454.5	529.3
Jun	268	302	81	102	51	71	13.3	18.8	2.3	3.0	415.1	496.5
Jul	293	323	94	111	56	76	15.3	20.0	3.0	3.9	460.8	533.4
Aug	287	310	94	112	56	64	14.2	19.9	2.6	3.9	453.8	509.7
Sep	229	279	76	97	50	63	14.2	20.4	2.2	3.5	371.4	463.3
Oct	281	320	62	80	40	49	11.3	16.9	1.4	2.0	395.2	467.8
Nov	225	266	45	64	37	46	7.3	12.1	0.9	2.0	315.2	389.5
Dec	189	210	37	54	31	37	4.1	11.1	0.9	1.9	262.0	313.6

2013

MONTH	LVVWD		COH		NLV		BC		NELLIS		TOTAL	
	Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Jan	194	214	38	56	32	39	4.4	11.3	0.9	1.7	269.3	321.9
Feb	198	220	39	59	34	44	4.2	10.5	1.1	2.3	276.3	334.8
Mar	242	276	47	68	37	48	7.4	12.3	1.7	2.3	334.6	405.8
Apr	274	310	54	74	38	49	9.8	17.5	1.8	2.4	377.1	453.3
May	337	374	69	92	46	57	12.0	16.2	2.0	2.8	466.0	541.0
Jun	277	312	84	104	51	67	13.3	18.8	2.3	3.0	427.1	504.3
Jul	303	334	97	115	55	80	15.3	20.0	3.0	3.9	473.3	552.4
Aug	297	320	97	114	55	63	14.2	19.9	2.6	3.9	465.8	520.6
Sep	237	289	80	101	51	62	14.2	20.4	2.2	3.5	384.4	475.1
Oct	288	327	65	84	41	50	11.3	16.9	1.4	2.0	406.7	479.0
Nov	230	272	47	66	37	46	7.3	12.1	0.9	2.0	322.2	398.0
Dec	194	215	39	57	31	37	4.1	11.1	0.9	1.9	268.5	321.7

2014

MONTH	LVVWD		COH		NLV		BC		NELLIS		TOTAL	
	Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)		Flow (MGD)	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Jan	199	219	39	56	33	41	4.4	11.3	0.9	1.7	275.8	328.1
Feb	203	225	41	59	34	44	4.2	10.5	1.1	2.3	282.8	340.3
Mar	247	282	49	68	37	48	7.4	12.3	1.7	2.3	341.6	411.8
Apr	280	317	56	74	39	51	9.8	17.5	1.8	2.4	386.1	461.6
May	345	383	72	92	45	55	12.0	16.2	2.0	2.8	476.0	549.3
Jun	286	322	86	106	51	67	13.3	18.8	2.3	3.0	438.1	516.3
Jul	312	344	99	117	58	80	15.3	20.0	3.0	3.9	487.3	564.9
Aug	306	330	99	116	55	63	14.2	19.9	2.6	3.9	476.8	533.1
Sep	245	298	81	102	52	63	14.2	20.4	2.2	3.5	393.9	486.8
Oct	294	335	65	85	41	50	11.3	16.9	1.4	2.0	412.7	488.5
Nov	235	279	47	67	37	46	7.3	12.1	0.9	2.0	327.2	406.0
Dec	198	220	39	57	32	38	4.1	11.1	0.9	1.9	273.5	327.9

2015

2013 - Annual Water Flow Projections

LAS VEGAS VALLEY WATER DISTRICT

MONTH	CAMPBELL					STEWART					FAYLE *					LINDEN	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	12	15	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Feb	13	16	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Mar	16	17	1835.9	1846	1	12	15	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Apr	21	27	1835.9	1846	1	15	19	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
May	24	31	1835.9	1846	1	19	19	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Jun	27	33	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Jul	39	44	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Aug	38	43	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Sep	28	37	1835.9	1846	1	15	19	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Oct	19	26	1835.9	1846	1	13	17	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Nov	15	16	1835.9	1846	1	12	15	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Dec	12	15	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0

MONTH	BROADBENT					CHARLESTON HEIGHTS					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	38	39	2182.6	2190.8	1	7	9	2154.7	2161.7	1	11	12	2207.7	2220	1
Feb	39	41	2182.6	2190.8	1	7	9	2154.7	2161.7	1	11	12	2207.7	2220	1
Mar	50	55	2182.6	2190.8	1	10	12	2154.7	2161.7	1	13	15	2207.7	2220	1
Apr	52	58	2182.6	2190.8	1	11	13	2154.7	2161.7	1	15	18	2207.7	2220	1
May	65	76	2182.6	2190.8	1	25	25	2154.7	2161.7	1	17	22	2207.7	2220	1
Jun	50	60	2182.6	2190.8	1	0	0	2154.7	2161.7	1	5	9	2207.7	2220	1
Jul	52	61	2182.6	2190.8	1	0	0	2154.7	2161.7	1	10	13	2207.7	2220	1
Aug	51	56	2182.6	2190.8	1	0	0	2154.7	2161.7	1	10	12	2207.7	2220	1
Sep	41	51	2182.6	2190.8	1	0	0	2154.7	2161.7	1	6	9	2207.7	2220	1
Oct	55	64	2182.6	2190.8	1	11	14	2154.7	2161.7	1	16	19	2207.7	2220	1
Nov	45	53	2182.6	2190.8	1	9	11	2154.7	2161.7	1	12	14	2207.7	2220	1
Dec	38	40	2182.6	2190.8	1	7	9	2154.7	2161.7	1	11	12	2207.7	2220	1

MONTH	DECATUR / TROPICAL					WARM SPRINGS					BERMUDA					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	19	20	2527.1	2540.5	1	74	81	2412.6	2427.6	1	19	21	2415	2427.4	1	190	209
Feb	19	20	2527.1	2540.5	1	75	83	2412.6	2427.6	1	19	21	2415	2427.4	1	193	214
Mar	21	23	2527.1	2540.5	1	93	109	2412.6	2427.6	1	21	23	2415	2427.4	1	236	269
Apr	25	27	2527.1	2540.5	1	106	114	2412.6	2427.6	1	22	26	2415	2427.4	1	267	302
May	28	34	2527.1	2540.5	1	128	133	2412.6	2427.6	1	23	25	2415	2427.4	1	329	365
Jun	15	20	2527.1	2540.5	1	129	135	2412.6	2427.6	1	23	25	2415	2427.4	1	268	302
Jul	19	22	2527.1	2540.5	1	129	135	2412.6	2427.6	1	25	28	2415	2427.4	1	293	323
Aug	18	21	2527.1	2540.5	1	127	131	2412.6	2427.6	1	24	27	2415	2427.4	1	287	310
Sep	15	19	2527.1	2540.5	1	102	119	2412.6	2427.6	1	22	25	2415	2427.4	1	229	279
Oct	27	29	2527.1	2540.5	1	115	123	2412.6	2427.6	1	25	28	2415	2427.4	1	281	320
Nov	20	23	2527.1	2540.5	1	92	111	2412.6	2427.6	1	20	23	2415	2427.4	1	225	266
Dec	19	20	2527.1	2540.5	1	73	81	2412.6	2427.6	1	19	21	2415	2427.4	1	189	210

* Fayle Reservoir to be taken out of service in 2013 for rehabilitation

2013 - Annual Water Flow Projections

CITY OF HENDERSON

MONTH	PARKWAY					BLACK MOUNTAIN					EQUESTRIAN					COLLEGE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	12	17	2493	2500	1	3	4.5	2230	2238	1	2.5	3.5	2232	2239	1	2.5	3.5	2494	2501	1
Feb	13	19	2493	2500	1	3	4.5	2230	2238	1	2.5	3.5	2232	2239	1	2.5	3.5	2494	2501	1
Mar	16	21	2493	2500	1	3.5	6	2230	2238	1	2.5	4	2232	2239	1	3.5	4.5	2494	2501	1
Apr	18	23	2493	2500	1	3.5	6	2230	2238	1	3	4	2232	2239	1	4.5	5.5	2494	2501	1
May	24	28	2493	2500	1	4.5	6.5	2230	2238	1	3.5	4.5	2232	2239	1	5	6	2494	2501	1
Jun	27	30	2493	2500	1	5.5	7.5	2230	2238	1	4.5	5.5	2232	2013	1	6.5	7.5	2494	2501	1
Jul	28	31	2493	2500	1	6	8	2230	2238	1	5	6	2232	2239	1	7	8	2494	2501	1
Aug	29	31	2493	2500	1	6	8	2230	2238	1	5	6	2232	2239	1	7	8	2494	2501	1
Sep	24	29	2493	2500	1	5	7	2230	2238	1	4.5	5.5	2232	2239	1	6	7	2494	2501	1
Oct	20	25	2493	2500	1	4	5.5	2230	2238	1	3.5	4	2232	2239	1	5	6	2494	2501	1
Nov	15	21	2493	2500	1	3	4.5	2230	2238	1	3	4	2232	2239	1	3.5	4.5	2494	2501	1
Dec	12	17	2493	2500	1	3	4.5	2230	2238	1	3	3.5	2232	2239	1	3	3.5	2494	2501	1

MONTH	HORIZON RIDGE					GIBSON / GALLERIA					PUMPING STATION NO. 3					NORTH				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	9	14	2362	2369	1	3	4	1865	1873	1	1.5	2.5	2093	2101	1	0.5	1.5	1831	1839	1
Feb	9	14	2362	2369	1	3	5	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1
Mar	9	14	2362	2369	1	4	5	1865	1873	1	2.5	3.5	2093	2101	1	1	2	1831	1839	1
Apr	10	15	2362	2369	1	4	6	1865	1873	1	3	4	2093	2101	1	1	2	1831	1839	1
May	13	21	2362	2369	1	8	11	1865	1873	1	3	4	2093	2101	1	1.5	2.5	1831	1839	1
Jun	18	25	2362	2369	1	9	12	1865	1873	1	3.5	4.5	2093	2014	1	2	3	1831	1839	1
Jul	26	29	2362	2369	1	10	12	1865	1873	1	4	5	2093	2101	1	2.5	3.5	1831	1839	1
Aug	26	30	2362	2369	1	10	12	1865	1873	1	4	5	2093	2101	1	2	3.5	1831	1839	1
Sep	19	24	2362	2369	1	9	11	1865	1873	1	3	4	2093	2101	1	1.5	3	1831	1839	1
Oct	16	20	2362	2369	1	6	8	1865	1873	1	2.5	3.5	2093	2101	1	1.5	2.5	1831	1839	1
Nov	11	15	2362	2369	1	4	5	1865	1873	1	2	3	2093	2101	1	1	2	1831	1839	1
Dec	9	13	2362	2369	1	3	4	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1

MONTH	MAGIC					FOOTHILLS					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	0.5	2	1831	1839	1	1	1.5	1906	1907	1	35.5	54
Feb	0.5	2	1831	1839	1	1	1.5	1906	1907	1	37	57.5
Mar	1	3	1831	1839	1	1.5	2	1906	1907	1	44.5	65
Apr	1.5	3.5	1831	1839	1	1.5	2.5	1906	1907	1	50	71.5
May	1.5	3.5	1831	1839	1	2.5	3	1906	1907	1	66.5	90
Jun	2	3.5	1831	1839	1	2.5	3.5	1906	1907	1	80.5	102
Jul	2	4	1831	1839	1	3	4	1906	1907	1	93.5	110.5
Aug	2	4	1831	1839	1	3	4	1906	1907	1	94	111.5
Sep	1.5	3	1831	1839	1	2.5	3.5	1906	1907	1	76	97
Oct	1	3	1831	1839	1	2	2.5	1906	1907	1	61.5	80
Nov	1	2.5	1831	1839	1	1.5	2	1906	1907	1	45	63.5
Dec	0.5	2	1831	1839	1	1	2	1906	1907	1	37	54

2013 - Annual Water Flow Projections

NORTH LAS VEGAS

MONTH	6C					TWIN LAKES PUMPING STATION					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂
	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)
Jan	3	4	2016	2027.5	1	2	2	2193.5	2207.5	1	11	14	2215.5	2224.5	1
Feb	3	4	2016	2027.5	1	2	3	2193.5	2207.5	1	11	14	2215.5	2224.5	1
Mar	3	4	2016	2027.5	1	3	4	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Apr	4	5	2016	2027.5	1	3	4	2193.5	2207.5	1	12	16	2215.5	2224.5	1
May	6	7	2019	2027.5	1	3	4	2199.5	2207.5	1	14	17	2215.5	2224.5	1
Jun	7	9	2019	2027.5	1	3	4	2199.5	2207.5	1	15	19	2215.5	2224.5	1
Jul	8	10	2019	2027.5	1	3	4	2199.5	2207.5	1	15	19	2215.5	2224.5	1
Aug	8	9	2019	2027.5	1	3	3	2199.5	2207.5	1	15	17	2215.5	2224.5	1
Sep	7	8	2019	2027.5	1	3	4	2199.5	2207.5	1	13	16	2215.5	2224.5	1
Oct	6	7	2016	2027.5	1	2	2	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Nov	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Dec	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	9	11	2215.5	2224.5	1

MONTH	GRAND TETON					DEER SPRINGS					DECATUR / MOCCASIN					Total	
	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)	
	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max
Jan	3	4	2323.5	2329	1	4	5	2317	2329	1	8	10	2420	2430	1	31	38
Feb	4	5	2323.5	2329	1	4	5	2317	2329	1	8	10	2420	2430	1	32	41
Mar	5	6	2323.5	2329	1	5	6	2317	2329	1	9	12	2420	2430	1	37	48
Apr	5	7	2323.5	2329	1	5	7	2317	2329	1	9	12	2420	2430	1	38	49
May	6	7	2323.5	2329	1	6	7	2322	2329	1	10	12	2422	2430	1	45	55
Jun	8	14	2323.5	2329	1	7	9	2322	2329	1	11	17	2422	2430	1	51	71
Jul	11	16	2323.5	2329	1	8	10	2322	2329	1	11	17	2422	2430	1	56	76
Aug	11	13	2323.5	2329	1	8	9	2322	2329	1	11	13	2422	2430	1	56	64
Sep	10	12	2323.5	2329	1	7	8	2322	2329	1	10	15	2422	2430	1	50	63
Oct	7	9	2323.5	2329	1	6	7	2317	2329	1	9	11	2420	2430	1	40	49
Nov	6	7	2323.5	2329	1	6	7	2317	2329	1	8	10	2420	2430	1	37	46
Dec	3	3	2323.5	2329	1	5	6	2317	2329	1	7	8	2420	2430	1	31	37

2013 - Annual Water Flow Projections

BOULDER CITY

MONTH	HEMENWAY					PUMPING STATION NO. 7				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	0.4	0.8	2305	2310	1	1.9	2.6	2560	2569	1
Feb	0.3	0.4	2305	2310	1	2.0	3.4	2560	2569	1
Mar	0.4	0.9	2305	2310	1	2.6	4.0	2562	2569	1
Apr	0.5	1.2	2305	2310	1	3.9	8.1	2562	2569	1
May	0.3	0.7	2310	2311.2	1	5.3	6.6	2565	2569	1
Jun	0.4	0.5	2310	2311.2	1	5.4	7.9	2565	2569	1
Jul	0.9	1.1	2310	2311.2	1	5.7	6.8	2565	2569	1
Aug	0.9	1.5	2310	2311.2	1	5.7	7.8	2565	2569	1
Sep	0.7	0.8	2310	2311.2	1	5.4	6.9	2565	2569	1
Oct	0.6	0.8	2305	2310	1	4.5	7.2	2562	2569	1
Nov	0.5	0.8	2305	2310	1	3.0	5.1	2560	2569	1
Dec	0.3	0.9	2305	2310	1	2.1	3.8	2560	2569	1

MONTH	PUMPING STATION NO.7B					BC RAW WATER PUMPING SYSTEM				Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max	Avg	Max
Jan	1.4	3.8	2655	2660	1	0.7	4.1	2655	2660	4.4	11.3
Feb	1.3	2.8	2655	2660	1	0.6	3.9	2655	2660	4.2	10.5
Mar	2.1	3.5	2655	2660	1	2.3	3.9	2655	2663	7.4	12.3
Apr	2.0	3.4	2655	2660	1	3.4	4.8	2655	2663	9.8	17.5
May	2.4	3.6	2660	2667	1	4.0	5.3	2660	2668	12.0	16.2
Jun	2.8	3.5	2660	2667	1	4.7	6.9	2660	2668	13.3	18.8
Jul	3.6	4.7	2660	2667	1	5.1	7.4	2660	2668	15.3	20.0
Aug	3.5	4.2	2660	2667	1	4.1	6.4	2660	2668	14.2	19.9
Sep	2.8	4.3	2660	2667	1	5.3	8.4	2660	2668	14.2	20.4
Oct	2.4	3.2	2655	2660	1	3.8	5.7	2655	2663	11.3	16.9
Nov	1.8	2.8	2655	2660	1	2.0	3.4	2655	2660	7.3	12.1
Dec	1.4	2.4	2655	2660	1	0.3	4.0	2655	2660	4.1	11.1

NELLIS

MONTH	NELLIS	
	Flow (MGD)	
	Avg	Max
Jan	0.9	1.7
Feb	1.1	2.3
Mar	1.7	2.3
Apr	1.8	2.4
May	2.0	2.8
Jun	2.3	3.0
Jul	3.0	3.9
Aug	2.6	3.9
Sep	2.2	3.5
Oct	1.4	2.0
Nov	0.9	2.0
Dec	0.9	1.9

2014 - Annual Water Flow Projections

LAS VEGAS VALLEY WATER DISTRICT

MONTH	CAMPBELL					STEWART					FAYLE *					LINDEN	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	13	16	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Feb	13	17	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Mar	17	18	1835.9	1846	1	12	16	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Apr	22	28	1835.9	1846	1	15	19	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
May	25	31	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Jun	28	34	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Jul	40	44	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Aug	39	44	1835.9	1846	1	19	20	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Sep	29	39	1835.9	1846	1	15	19	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Oct	23	30	1835.9	1846	1	13	17	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Nov	16	17	1835.9	1846	1	14	17	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0
Dec	13	16	1835.9	1846	1	10	12	1973.5	1987.5	1	0	0	N/A	N/A	1	0	0

MONTH	BROADBENT					CHARLESTON HEIGHTS					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	39	40	2182.6	2190.8	1	7	9	2154.7	2161.7	1	11	12	2207.7	2220	1
Feb	40	42	2182.6	2190.8	1	8	10	2154.7	2161.7	1	11	12	2207.7	2220	1
Mar	51	56	2182.6	2190.8	1	11	13	2154.7	2161.7	1	13	15	2207.7	2220	1
Apr	53	59	2182.6	2190.8	1	12	15	2154.7	2161.7	1	16	19	2207.7	2220	1
May	68	77	2182.6	2190.8	1	25	25	2154.7	2161.7	1	18	22	2207.7	2220	1
Jun	56	62	2182.6	2190.8	1	0	0	2154.7	2161.7	1	5	9	2207.7	2220	1
Jul	54	63	2182.6	2190.8	1	0	0	2154.7	2161.7	1	11	14	2207.7	2220	1
Aug	53	58	2182.6	2190.8	1	0	0	2154.7	2161.7	1	11	13	2207.7	2220	1
Sep	43	53	2182.6	2190.8	1	0	0	2154.7	2161.7	1	7	10	2207.7	2220	1
Oct	58	67	2182.6	2190.8	1	11	14	2154.7	2161.7	1	17	20	2207.7	2220	1
Nov	46	55	2182.6	2190.8	1	9	11	2154.7	2161.7	1	12	14	2207.7	2220	1
Dec	39	41	2182.6	2190.8	1	8	10	2154.7	2161.7	1	11	12	2207.7	2220	1

MONTH	DECATUR / TROPICAL					WARM SPRINGS					BERMUDA					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	20	21	2527.1	2540.5	1	75	83	2412.6	2427.6	1	19	21	2415	2427.4	1	194	214
Feb	20	21	2527.1	2540.5	1	76	84	2412.6	2427.6	1	20	22	2415	2427.4	1	198	220
Mar	22	24	2527.1	2540.5	1	94	110	2412.6	2427.6	1	22	24	2415	2427.4	1	242	276
Apr	26	28	2527.1	2540.5	1	107	115	2412.6	2427.6	1	23	27	2415	2427.4	1	274	310
May	29	36	2527.1	2540.5	1	129	137	2412.6	2427.6	1	24	26	2415	2427.4	1	337	374
Jun	16	21	2527.1	2540.5	1	129	140	2412.6	2427.6	1	24	26	2415	2427.4	1	277	312
Jul	21	24	2527.1	2540.5	1	132	140	2412.6	2427.6	1	26	29	2415	2427.4	1	303	334
Aug	20	23	2527.1	2540.5	1	130	134	2412.6	2427.6	1	25	28	2415	2427.4	1	297	320
Sep	16	20	2527.1	2540.5	1	104	122	2412.6	2427.6	1	23	26	2415	2427.4	1	237	289
Oct	28	30	2527.1	2540.5	1	112	120	2412.6	2427.6	1	26	29	2415	2427.4	1	288	327
Nov	21	24	2527.1	2540.5	1	91	110	2412.6	2427.6	1	21	24	2415	2427.4	1	230	272
Dec	20	21	2527.1	2540.5	1	74	82	2412.6	2427.6	1	19	21	2415	2427.4	1	194	215

* Fayle Reservoir to be taken out of service in 2013 for rehabilitation

2014 - Annual Water Flow Projections

CITY OF HENDERSON

MONTH	PARKWAY					BLACK MOUNTAIN					EQUESTRIAN					COLLEGE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	12	17	2493	2500	1	3.5	4.5	2230	2238	1	2.5	3.5	2232	2239	1	3	4	2494	2501	1
Feb	13	19	2493	2500	1	3.5	4.5	2230	2238	1	2.5	3.5	2232	2239	1	3	4	2494	2501	1
Mar	16	21	2493	2500	1	4	6	2230	2238	1	2.5	4	2232	2239	1	4	5	2494	2501	1
Apr	18	23	2493	2500	1	4	6	2230	2238	1	3.5	4.5	2232	2239	1	4.5	6	2494	2501	1
May	24	28	2493	2500	1	5	6.5	2230	2238	1	4	5	2232	2239	1	5.5	6.5	2494	2501	1
Jun	27	30	2493	2500	1	5.5	7.5	2230	2238	1	4.5	5.5	2232	2013	1	6.5	7.5	2494	2501	1
Jul	29	31	2493	2500	1	6.5	8.5	2230	2238	1	5.5	6	2232	2239	1	7.5	8.5	2494	2501	1
Aug	29	31	2493	2500	1	6.5	8.5	2230	2238	1	5.5	6	2232	2239	1	7.5	8.5	2494	2501	1
Sep	24	29	2493	2500	1	5.5	7.5	2230	2238	1	5	5.5	2232	2239	1	6.5	7.5	2494	2501	1
Oct	20	25	2493	2500	1	4.5	6	2230	2238	1	4	4.5	2232	2239	1	5.5	6.5	2494	2501	1
Nov	15	21	2493	2500	1	3.5	5	2230	2238	1	3	4	2232	2239	1	4	5	2494	2501	1
Dec	12	17	2493	2500	1	3.5	5	2230	2238	1	3	4	2232	2239	1	3	4	2494	2501	1

MONTH	HORIZON RIDGE					GIBSON / GALLERIA					PUMPING STATION NO. 3					NORTH				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	10	14	2362	2369	1	3	4	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1
Feb	10	14	2362	2369	1	3	5	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1
Mar	10	15	2362	2369	1	4	5	1865	1873	1	2.5	4	2093	2101	1	1	2	1831	1839	1
Apr	11	16	2362	2369	1	5	6	1865	1873	1	3	4	2093	2101	1	1	2	1831	1839	1
May	14	21	2362	2369	1	8	11	1865	1873	1	3	4	2093	2101	1	1.5	2.5	1831	1839	1
Jun	19	26	2362	2369	1	10	12	1865	1873	1	4	5	2093	2014	1	2	3	1831	1839	1
Jul	26	30	2362	2369	1	10	13	1865	1873	1	4.5	5.5	2093	2101	1	2.5	3.5	1831	1839	1
Aug	26	30	2362	2369	1	10	12	1865	1873	1	4.5	5.5	2093	2101	1	2.5	3.5	1831	1839	1
Sep	20	25	2362	2369	1	9	11	1865	1873	1	4	4.5	2093	2101	1	2	3	1831	1839	1
Oct	17	21	2362	2369	1	6	8	1865	1873	1	3	4	2093	2101	1	1.5	2.5	1831	1839	1
Nov	12	16	2362	2369	1	4	5	1865	1873	1	2	3	2093	2101	1	1	2	1831	1839	1
Dec	10	14	2362	2369	1	3	4	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1

MONTH	MAGIC					FOOTHILLS					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	0.5	2	1831	1839	1	1	2	1906	1907	1	38	56
Feb	0.5	2	1831	1839	1	1	2	1906	1907	1	39	59
Mar	1	3	1831	1839	1	1.5	2.5	1906	1907	1	47	68
Apr	1.5	3.5	1831	1839	1	2	3	1906	1907	1	54	74
May	1.5	3.5	1831	1839	1	2.5	3.5	1906	1907	1	69	92
Jun	2	3.5	1831	1839	1	3	4	1906	1907	1	84	104
Jul	2.5	4	1831	1839	1	3	4.5	1906	1907	1	97	115
Aug	2.5	4	1831	1839	1	3	4.5	1906	1907	1	97	114
Sep	1.5	3.5	1831	1839	1	2.5	4	1906	1907	1	80	101
Oct	1	3	1831	1839	1	2.5	3	1906	1907	1	65	84
Nov	1	2.5	1831	1839	1	1.5	2.5	1906	1907	1	47	66
Dec	0.5	2	1831	1839	1	1	2	1906	1907	1	39	57

2014 - Annual Water Flow Projections NORTH LAS VEGAS

MONTH	6C					TWIN LAKES PUMPING STATION					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	3	4	2016	2027.5	1	2	2	2193.5	2207.5	1	11	14	2215.5	2224.5	1
Feb	3	4	2016	2027.5	1	2	3	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Mar	3	4	2016	2027.5	1	3	4	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Apr	4	5	2016	2027.5	1	3	4	2193.5	2207.5	1	12	16	2215.5	2224.5	1
May	6	7	2019	2027.5	1	3	4	2199.5	2207.5	1	14	17	2215.5	2224.5	1
Jun	7	9	2019	2027.5	1	3	4	2199.5	2207.5	1	15	19	2215.5	2224.5	1
Jul	8	11	2019	2027.5	1	3	6	2199.5	2207.5	1	15	20	2215.5	2224.5	1
Aug	8	9	2019	2027.5	1	3	3	2199.5	2207.5	1	15	17	2215.5	2224.5	1
Sep	7	8	2019	2027.5	1	3	4	2199.5	2207.5	1	13	16	2215.5	2224.5	1
Oct	6	7	2016	2027.5	1	3	4	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Nov	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Dec	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	9	11	2215.5	2224.5	1

MONTH	GRAND TETON					DEER SPRINGS					DECATUR / MOCCASIN					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	3	4	2323.5	2329	1	5	6	2317	2329	1	8	10	2420	2430	1	32	39
Feb	4	5	2323.5	2329	1	5	6	2317	2329	1	8	10	2420	2430	1	34	44
Mar	5	6	2323.5	2329	1	5	6	2317	2329	1	9	12	2420	2430	1	37	48
Apr	5	7	2323.5	2329	1	5	7	2317	2329	1	9	12	2420	2430	1	38	49
May	6	7	2323.5	2329	1	6	7	2322	2329	1	11	14	2422	2430	1	46	57
Jun	8	10	2323.5	2329	1	7	9	2322	2329	1	11	17	2422	2430	1	51	67
Jul	11	16	2323.5	2329	1	7	10	2322	2329	1	11	17	2422	2430	1	55	80
Aug	11	13	2323.5	2329	1	7	8	2322	2329	1	11	13	2422	2430	1	55	63
Sep	11	13	2323.5	2329	1	7	8	2322	2329	1	10	12	2422	2430	1	51	62
Oct	7	8	2323.5	2329	1	6	7	2317	2329	1	9	11	2420	2430	1	41	50
Nov	6	7	2323.5	2329	1	6	7	2317	2329	1	8	10	2420	2430	1	37	46
Dec	3	4	2323.5	2329	1	5	6	2317	2329	1	7	8	2420	2430	1	31	37

2014 - Annual Water Flow Projections

BOULDER CITY

MONTH	HEMENWAY					PUMPING STATION NO. 7				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	0.4	0.8	2305	2310	1	1.9	2.6	2560	2569	1
Feb	0.3	0.4	2305	2310	1	2.0	3.4	2560	2569	1
Mar	0.4	0.9	2305	2310	1	2.6	4.0	2562	2569	1
Apr	0.5	1.2	2305	2310	1	3.9	8.1	2562	2569	1
May	0.3	0.7	2310	2311.2	1	5.3	6.6	2565	2569	1
Jun	0.4	0.5	2310	2311.2	1	5.4	7.9	2565	2569	1
Jul	0.9	1.1	2310	2311.2	1	5.7	6.8	2565	2569	1
Aug	0.9	1.5	2310	2311.2	1	5.7	7.8	2565	2569	1
Sep	0.7	0.8	2310	2311.2	1	5.4	6.9	2565	2569	1
Oct	0.6	0.8	2305	2310	1	4.5	7.2	2562	2569	1
Nov	0.5	0.8	2305	2310	1	3.0	5.1	2560	2569	1
Dec	0.3	0.9	2305	2310	1	2.1	3.8	2560	2569	1

MONTH	PUMPING STATION NO.7B					BC RAW WATER PUMPING SYSTEM				Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max	Avg	Max
Jan	1.4	3.8	2655	2660	1	0.7	4.1	2655	2660	4.4	11.3
Feb	1.3	2.8	2655	2660	1	0.6	3.9	2655	2660	4.2	10.5
Mar	2.1	3.5	2655	2660	1	2.3	3.9	2655	2663	7.4	12.3
Apr	2.0	3.4	2655	2660	1	3.4	4.8	2655	2663	9.8	17.5
May	2.4	3.6	2660	2667	1	4.0	5.3	2660	2668	12.0	16.2
Jun	2.8	3.5	2660	2667	1	4.7	6.9	2660	2668	13.3	18.8
Jul	3.6	4.7	2660	2667	1	5.1	7.4	2660	2668	15.3	20.0
Aug	3.5	4.2	2660	2667	1	4.1	6.4	2660	2668	14.2	19.9
Sep	2.8	4.3	2660	2667	1	5.3	8.4	2660	2668	14.2	20.4
Oct	2.4	3.2	2655	2660	1	3.8	5.7	2655	2663	11.3	16.9
Nov	1.8	2.8	2655	2660	1	2.0	3.4	2655	2660	7.3	12.1
Dec	1.4	2.4	2655	2660	1	0.3	4.0	2655	2660	4.1	11.1

NELLIS

MONTH	NELLIS	
	Flow (MGD)	
	Avg	Max
Jan	0.9	1.7
Feb	1.1	2.3
Mar	1.7	2.3
Apr	1.8	2.4
May	2.0	2.8
Jun	2.3	3.0
Jul	3.0	3.9
Aug	2.6	3.9
Sep	2.2	3.5
Oct	1.4	2.0
Nov	0.9	2.0
Dec	0.9	1.9

2015 - Annual Water Flow Projections

LAS VEGAS VALLEY WATER DISTRICT

MONTH	CAMPBELL					STEWART					FAYLE					LINDEN	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	14	17	1835.9	1846	1	12	14	1973.5	1987.5	1	38	39	2175.3	2187.3	1	0	0
Feb	14	17	1835.9	1846	1	12	14	1973.5	1987.5	1	39	40	2175.3	2187.3	1	0	0
Mar	19	21	1835.9	1846	1	13	17	1973.5	1987.5	1	46	52	2175.3	2187.3	1	0	0
Apr	24	30	1835.9	1846	1	17	21	1973.5	1987.5	1	51	52	2175.3	2187.3	1	0	0
May	27	31	1835.9	1846	1	21	22	1973.5	1987.5	1	60	60	2175.3	2187.3	1	0	0
Jun	28	34	1835.9	1846	1	21	22	1973.5	1987.5	1	57	64	2175.3	2187.3	1	0	0
Jul	40	45	1835.9	1846	1	21	22	1973.5	1987.5	1	55	60	2175.3	2187.3	1	0	0
Aug	40	45	1835.9	1846	1	21	22	1973.5	1987.5	1	54	58	2175.3	2187.3	1	0	0
Sep	29	39	1835.9	1846	1	17	21	1973.5	1987.5	1	43	52	2175.3	2187.3	1	0	0
Oct	24	31	1835.9	1846	1	15	19	1973.5	1987.5	1	54	62	2175.3	2187.3	1	0	0
Nov	17	18	1835.9	1846	1	16	19	1973.5	1987.5	1	44	54	2175.3	2187.3	1	0	0
Dec	14	17	1835.9	1846	1	12	14	1973.5	1987.5	1	37	39	2175.3	2187.3	1	0	0

MONTH	BROADBENT					CHARLESTON HEIGHTS					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	19	21	2182.6	2190.8	1	10	12	2154.7	2161.7	1	9	10	2207.7	2220	1
Feb	20	22	2182.6	2190.8	1	10	12	2154.7	2161.7	1	9	11	2207.7	2220	1
Mar	19	24	2182.6	2190.8	1	16	17	2154.7	2161.7	1	14	15	2207.7	2220	1
Apr	19	24	2182.6	2190.8	1	20	20	2154.7	2161.7	1	15	18	2207.7	2220	1
May	28	31	2182.6	2190.8	1	21	23	2154.7	2161.7	1	20	22	2207.7	2220	1
Jun	26	29	2182.6	2190.8	1	0	0	2154.7	2161.7	1	5	10	2207.7	2220	1
Jul	33	38	2182.6	2190.8	1	0	0	2154.7	2161.7	1	12	13	2207.7	2220	1
Aug	33	36	2182.6	2190.8	1	0	0	2154.7	2161.7	1	11	12	2207.7	2220	1
Sep	27	32	2182.6	2190.8	1	0	0	2154.7	2161.7	1	8	11	2207.7	2220	1
Oct	36	41	2182.6	2190.8	1	11	13	2154.7	2161.7	1	17	21	2207.7	2220	1
Nov	26	30	2182.6	2190.8	1	9	11	2154.7	2161.7	1	12	15	2207.7	2220	1
Dec	19	21	2182.6	2190.8	1	10	12	2154.7	2161.7	1	9	10	2207.7	2220	1

MONTH	DECATUR / TROPICAL					WARM SPRINGS					BERMUDA					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	19	20	2527.1	2540.5	1	59	63	2412.6	2427.6	1	19	23	2415	2427.4	1	199	219
Feb	19	20	2527.1	2540.5	1	61	66	2412.6	2427.6	1	19	23	2415	2427.4	1	203	225
Mar	23	28	2527.1	2540.5	1	75	84	2412.6	2427.6	1	22	24	2415	2427.4	1	247	282
Apr	26	28	2527.1	2540.5	1	82	94	2412.6	2427.6	1	26	30	2415	2427.4	1	280	317
May	32	40	2527.1	2540.5	1	109	119	2412.6	2427.6	1	27	35	2415	2427.4	1	345	383
Jun	16	19	2527.1	2540.5	1	111	119	2412.6	2427.6	1	22	25	2415	2427.4	1	286	322
Jul	24	25	2527.1	2540.5	1	101	114	2412.6	2427.6	1	26	27	2415	2427.4	1	312	344
Aug	20	22	2527.1	2540.5	1	101	108	2412.6	2427.6	1	26	27	2415	2427.4	1	306	330
Sep	17	20	2527.1	2540.5	1	80	97	2412.6	2427.6	1	24	26	2415	2427.4	1	245	298
Oct	28	30	2527.1	2540.5	1	84	90	2412.6	2427.6	1	25	28	2415	2427.4	1	294	335
Nov	20	24	2527.1	2540.5	1	71	85	2412.6	2427.6	1	20	23	2415	2427.4	1	235	279
Dec	19	20	2527.1	2540.5	1	59	64	2412.6	2427.6	1	19	23	2415	2427.4	1	198	220

2015 - Annual Water Flow Projections

CITY OF HENDERSON

MONTH	PARKWAY					BLACK MOUNTAIN					EQUESTRIAN					COLLEGE				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	12	17	2493	2500	1	3.5	4.5	2230	2238	1	3	3.5	2232	2239	1	3	4	2494	2501	1
Feb	13	19	2493	2500	1	3.5	4.5	2230	2238	1	3	4	2232	2239	1	3	4	2494	2501	1
Mar	16	21	2493	2500	1	4	6	2230	2238	1	3	4	2232	2239	1	4	5	2494	2501	1
Apr	18	23	2493	2500	1	4.5	6	2230	2238	1	4	4.5	2232	2239	1	5	6	2494	2501	1
May	24	28	2493	2500	1	5	6.5	2230	2238	1	4	5	2232	2239	1	5.5	6.5	2494	2501	1
Jun	27	30	2493	2500	1	6	7.5	2230	2238	1	5	5.5	2232	2013	1	7	8	2494	2501	1
Jul	29	31	2493	2500	1	7	8.5	2230	2238	1	6	6.5	2232	2239	1	7.5	9	2494	2501	1
Aug	29	31	2493	2500	1	7	8.5	2230	2238	1	6	6.5	2232	2239	1	7.5	9	2494	2501	1
Sep	24	29	2493	2500	1	5.5	7.5	2230	2238	1	5	5.5	2232	2239	1	6.5	7.5	2494	2501	1
Oct	20	25	2493	2500	1	4.5	6	2230	2238	1	4	4.5	2232	2239	1	5.5	6.5	2494	2501	1
Nov	15	21	2493	2500	1	3.5	5	2230	2238	1	3	4	2232	2239	1	4	5	2494	2501	1
Dec	12	17	2493	2500	1	3.5	5	2230	2238	1	3	4	2232	2239	1	3	4	2494	2501	1

MONTH	HORIZON RIDGE					GIBSON / GALLERIA					PUMPING STATION NO. 3					NORTH				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	10	14	2362	2369	1	3	4	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1
Feb	11	14	2362	2369	1	3	5	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1
Mar	11	15	2362	2369	1	4	5	1865	1873	1	3	4	2093	2101	1	1	2	1831	1839	1
Apr	11	16	2362	2369	1	5	6	1865	1873	1	3	4	2093	2101	1	1.5	2	1831	1839	1
May	15	21	2362	2369	1	9	11	1865	1873	1	3.5	4.5	2093	2101	1	1.5	2.5	1831	1839	1
Jun	19	27	2362	2369	1	10	12	1865	1873	1	4	5	2093	2014	1	2	3	1831	1839	1
Jul	26	31	2362	2369	1	10	13	1865	1873	1	5	6	2093	2101	1	2.5	3.5	1831	1839	1
Aug	26	31	2362	2369	1	10	12	1865	1873	1	5	6	2093	2101	1	2.5	3.5	1831	1839	1
Sep	20	26	2362	2369	1	9	11	1865	1873	1	4	5	2093	2101	1	2	3	1831	1839	1
Oct	17	22	2362	2369	1	6	8	1865	1873	1	3	4	2093	2101	1	1.5	2.5	1831	1839	1
Nov	12	17	2362	2369	1	4	5	1865	1873	1	2	3	2093	2101	1	1	2	1831	1839	1
Dec	10	14	2362	2369	1	3	4	1865	1873	1	2	3	2093	2101	1	0.5	1.5	1831	1839	1

MONTH	MAGIC					FOOTHILLS					Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max		Avg	Max
Jan	0.5	2	1831	1839	1	1	2	1906	1907	1	39	56
Feb	0.5	2	1831	1839	1	1	2	1906	1907	1	41	59
Mar	1	3	1831	1839	1	1.5	2.5	1906	1907	1	49	68
Apr	1.5	3.5	1831	1839	1	2	3	1906	1907	1	56	74
May	2	3.5	1831	1839	1	2.5	3.5	1906	1907	1	72	92
Jun	2.5	4	1831	1839	1	3	4	1906	1907	1	86	106
Jul	2.5	4	1831	1839	1	3.5	4.5	1906	1907	1	99	117
Aug	2.5	4	1831	1839	1	3.5	4.5	1906	1907	1	99	116
Sep	1.5	3.5	1831	1839	1	3	4	1906	1907	1	81	102
Oct	1	3	1831	1839	1	2.5	3.5	1906	1907	1	65	85
Nov	1	2.5	1831	1839	1	1.5	2.5	1906	1907	1	47	67
Dec	0.5	2	1831	1839	1	1	2	1906	1907	1	39	57

2015 - Annual Water Flow Projections

NORTH LAS VEGAS

MONTH	6C					TWIN LAKES PUMPING STATION					CARLTON SQUARE				
	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂
	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)
Jan	3	4	2016	2027.5	1	2	2	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Feb	3	4	2016	2027.5	1	2	3	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Mar	3	4	2016	2027.5	1	3	4	2193.5	2207.5	1	12	15	2215.5	2224.5	1
Apr	4	5	2016	2027.5	1	3	4	2193.5	2207.5	1	12	16	2215.5	2224.5	1
May	6	7	2019	2027.5	1	3	4	2199.5	2207.5	1	14	17	2215.5	2224.5	1
Jun	7	9	2019	2027.5	1	3	4	2199.5	2207.5	1	15	19	2215.5	2224.5	1
Jul	8	11	2019	2027.5	1	3	6	2199.5	2207.5	1	15	20	2215.5	2224.5	1
Aug	8	9	2019	2027.5	1	3	3	2199.5	2207.5	1	15	17	2215.5	2224.5	1
Sep	8	10	2019	2027.5	1	3	4	2199.5	2207.5	1	13	16	2215.5	2224.5	1
Oct	6	7	2016	2027.5	1	3	4	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Nov	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	10	12	2215.5	2224.5	1
Dec	5	6	2016	2027.5	1	2	2	2193.5	2207.5	1	10	12	2215.5	2224.5	1

MONTH	GRAND TETON					DEER SPRINGS					DECATUR / MOCCASIN					Total	
	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)		HGL (ft)		Cl ₂	Flow (MGD)	
	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max	Min	Max	(mg/L)	Avg	Max
Jan	3	4	2323.5	2329	1	5	6	2317	2329	1	8	10	2420	2430	1	33	41
Feb	4	5	2323.5	2329	1	5	6	2317	2329	1	8	10	2420	2430	1	34	44
Mar	5	6	2323.5	2329	1	5	6	2317	2329	1	9	12	2420	2430	1	37	48
Apr	5	7	2323.5	2329	1	5	7	2317	2329	1	10	13	2420	2430	1	39	51
May	6	7	2323.5	2329	1	6	7	2322	2329	1	10	12	2422	2430	1	45	55
Jun	8	10	2323.5	2329	1	7	9	2322	2329	1	11	17	2422	2430	1	51	67
Jul	12	16	2323.5	2329	1	8	10	2322	2329	1	12	17	2422	2430	1	58	80
Aug	11	13	2323.5	2329	1	7	8	2322	2329	1	11	13	2422	2430	1	55	63
Sep	11	13	2323.5	2329	1	7	8	2322	2329	1	10	12	2422	2430	1	52	63
Oct	7	8	2323.5	2329	1	6	7	2317	2329	1	9	11	2420	2430	1	41	50
Nov	6	7	2323.5	2329	1	6	7	2317	2329	1	8	10	2420	2430	1	37	46
Dec	3	4	2323.5	2329	1	5	6	2317	2329	1	7	8	2420	2430	1	32	38

2015 - Annual Water Flow Projections

BOULDER CITY

MONTH	HEMENWAY					PUMPING STATION NO. 7				
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)
	Avg	Max	Min	Max		Avg	Max	Min	Max	
Jan	0.4	0.8	2305	2310	1	1.9	2.6	2560	2569	1
Feb	0.3	0.4	2305	2310	1	2.0	3.4	2560	2569	1
Mar	0.4	0.9	2305	2310	1	2.6	4.0	2562	2569	1
Apr	0.5	1.2	2305	2310	1	3.9	8.1	2562	2569	1
May	0.3	0.7	2310	2311.2	1	5.3	6.6	2565	2569	1
Jun	0.4	0.5	2310	2311.2	1	5.4	7.9	2565	2569	1
Jul	0.9	1.1	2310	2311.2	1	5.7	6.8	2565	2569	1
Aug	0.9	1.5	2310	2311.2	1	5.7	7.8	2565	2569	1
Sep	0.7	0.8	2310	2311.2	1	5.4	6.9	2565	2569	1
Oct	0.6	0.8	2305	2310	1	4.5	7.2	2562	2569	1
Nov	0.5	0.8	2305	2310	1	3.0	5.1	2560	2569	1
Dec	0.3	0.9	2305	2310	1	2.1	3.8	2560	2569	1

MONTH	PUMPING STATION NO.7B					BC RAW WATER PUMPING SYSTEM				Total	
	Flow (MGD)		HGL (ft)		Cl ₂ (mg/L)	Flow (MGD)		HGL (ft)		Flow (MGD)	
	Avg	Max	Min	Max		Avg	Max	Min	Max	Avg	Max
Jan	1.4	3.8	2655	2660	1	0.7	4.1	2655	2660	4.4	11.3
Feb	1.3	2.8	2655	2660	1	0.6	3.9	2655	2660	4.2	10.5
Mar	2.1	3.5	2655	2660	1	2.3	3.9	2655	2663	7.4	12.3
Apr	2.0	3.4	2655	2660	1	3.4	4.8	2655	2663	9.8	17.5
May	2.4	3.6	2660	2667	1	4.0	5.3	2660	2668	12.0	16.2
Jun	2.8	3.5	2660	2667	1	4.7	6.9	2660	2668	13.3	18.8
Jul	3.6	4.7	2660	2667	1	5.1	7.4	2660	2668	15.3	20.0
Aug	3.5	4.2	2660	2667	1	4.1	6.4	2660	2668	14.2	19.9
Sep	2.8	4.3	2660	2667	1	5.3	8.4	2660	2668	14.2	20.4
Oct	2.4	3.2	2655	2660	1	3.8	5.7	2655	2663	11.3	16.9
Nov	1.8	2.8	2655	2660	1	2.0	3.4	2655	2660	7.3	12.1
Dec	1.4	2.4	2655	2660	1	0.3	4.0	2655	2660	4.1	11.1

NELLIS

MONTH	NELLIS	
	Flow (MGD)	
	Avg	Max
Jan	0.9	1.7
Feb	1.1	2.3
Mar	1.7	2.3
Apr	1.8	2.4
May	2.0	2.8
Jun	2.3	3.0
Jul	3.0	3.9
Aug	2.6	3.9
Sep	2.2	3.5
Oct	1.4	2.0
Nov	0.9	2.0
Dec	0.9	1.9

**SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS**

AGENDA ITEM

November 15, 2012

Subject: 2013 Revenue Refunding Bond Resolution	Director's Backup
Petitioner: Philip D. Speight, Deputy General Manager, Administration	
Recommendations: That the Board of Directors adopt the 2013 Revenue Refunding Bond Resolution, authorizing the issuance of the Southern Nevada Water Authority Revenue Refunding Bonds, Series 2013; providing that the Bonds may be evidenced by a single registered bond; fixing the terms and conditions thereof and covenants relating to the payment of the Bonds; and securing their payment by a pledge of revenues derived from the Southern Nevada Water Authority.	

Fiscal Impact:

The Authority will be obligated to make debt service payments from Authority revenues. The Authority will receive funds to make these payments from the beneficiaries of the facilities.

Background:

Pursuant to the SNWA 1995 Amended Cooperative Agreement and the SNWA Facilities and Operations Agreement, the Board of Directors has the ability to issue revenue and other bonds, notes and obligations, and incur liabilities secured by revenues of the Southern Nevada Water System.

Nevada law provides that the Authority may issue revenue bonds directly to the municipal marketplace or through such programs as the Nevada Municipal Bond Bank. The 2013 Revenue Refunding Bond Resolution authorizes the issuance of up to \$23,000,000 in bonds for the purpose of refunding all of the remaining principal maturing in 2028 of the Authority's outstanding 1998 water revenue bonds (1998 Revenue Bonds) purchased by the Nevada Municipal Bond Bank, which were originally issued by the Authority for the purpose of financing infrastructure projects for its water system. The Nevada Municipal Bond Bank will also purchase the 2013 Revenue Refunding Bonds from the Authority through the issuance of its bonds.

On November 13, 2012, the Nevada State Board for Financing Water Projects considered a resolution authorizing the issuance of a loan commitment to the Authority in an amount not to exceed \$23,000,000.

If the 2013 Revenue Refunding Bond Resolution is approved, on December 6, 2012, the Authority's Director of Finance shall present to the Debt Management Commission of Clark County the Authority's proposal to issue its revenue refunding bonds in the maximum principal amount of \$23,000,000.

AGENDA
ITEM #

8

2013 Revenue Refunding Bond Resolution

November 15, 2012

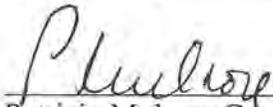
Page 2

The bond proceeds will be used to refinance the Authority's 1998 Revenue Bond to reduce the Authority's existing debt service obligations in fiscal years 2013 through 2028, with a majority of the savings occurring in fiscal year 2028. Therefore, the Board is being asked to adopt the attached 2013 Revenue Refunding Bond Resolution.

The Resolution may only be adopted by a majority vote of the Authority Board with the affirmative vote of the directors appointed by an SNWA purveyor member.

This resolution is authorized pursuant to NRS Chapter 277 and Section 6(l) of the SNWA 1995 Amended Cooperative Agreement. The office of the General Counsel has reviewed and approved this resolution.

Respectfully submitted:



Patricia Mulroy, General Manager

PM:PDS:WTF:kah

Attachment

Summary - a resolution authorizing the issuance by the Southern Nevada Water Authority of its Water Revenue Refunding Bonds, Series 2013 and providing other matters relating thereto.

RESOLUTION

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE SOUTHERN NEVADA WATER AUTHORITY DESIGNATED BY THE SHORT TITLE "2013 REVENUE REFUNDING BOND RESOLUTION"; PROVIDING FOR THE ISSUANCE OF ITS REVENUE REFUNDING BONDS, SERIES 2013; PROVIDING THAT THE BONDS MAY BE EVIDENCED BY A SINGLE REGISTERED BOND; FIXING THE TERMS AND CONDITIONS THEREOF AND COVENANTS RELATING TO THE PAYMENT OF SAID BONDS; SECURING THEIR PAYMENT BY A PLEDGE OF REVENUES DERIVED FROM THE SOUTHERN NEVADA WATER SYSTEM; RATIFYING ACTION PREVIOUSLY TAKEN TOWARD THE ISSUANCE OF SAID BONDS AND EFFECTING THE PURPOSE OF THEIR ISSUANCE; PROVIDING OTHER MATTERS RELATING THERETO; AND PROVIDING THE EFFECTIVE DATE HEREOF.

WHEREAS, the Southern Nevada Water Authority, Nevada (the "Authority"; or the "SNWA") was duly organized and is operating in accordance with the provisions of an interlocal agreement dated July 25, 1991, as amended (the "SNWA Cooperative Agreement") entered into pursuant to the provisions of NRS 277.080 to 277.180, inclusive, as amended (the "Authority Act"); and

WHEREAS, the Board of Directors (the "Board") of the Authority, in Clark County, Nevada (the "County" and the "State" respectively) has the authority to issue revenue and other bonds, notes and other obligations and incur liabilities for the purposes of refunding (the "Project") all or a portion of the Southern Nevada Water Authority, Nevada Water Revenue Bond, Series July 1, 1998 (the "1998 Revenue Bond"); and

WHEREAS, pursuant to the SNWA Cooperative Agreement and the SNWS Operating Agreement (hereinafter defined), the Board is authorized to issue revenue bonds secured by revenues of the SNWS Water System (hereinafter defined); and

WHEREAS, pursuant to NRS 350A.152, the Chief Financial Officer of the Authority shall submit to the Debt Management Commission of Clark County (the "Commission") the Authority's proposal to issue its revenue refunding bonds in the maximum principal amount of \$23,000,000 (the "Proposal"); and

WHEREAS, the members of the Authority have contracted with the Authority in the SNWS Operating Agreement to make payments from the revenues of the water systems of the members of the Authority, which in the aggregate are fully sufficient to pay the Bond Requirements of the Bonds (as hereinafter defined); and

WHEREAS, the Board has determined and does hereby declare that it is necessary and for the best interest of the Authority to complete the Project and to issue the revenue refunding bonds of the Authority for such purpose; and

WHEREAS, the Authority authorizes the Treasurer of the Authority (the "Treasurer") or his designee to request the Treasurer of the State of Nevada (the "State Treasurer"), as administrator of the municipal bond bank of the State under NRS Chapter 350A (the "Bond Bank Act"), to make a loan to the Authority by purchasing bonds of the Authority (the "Municipal Securities") in the aggregate principal amount sufficient to effect the Project (the "Lending Project"); and

WHEREAS, the Municipal Securities are to be issued for the Project; and

WHEREAS, the State Treasurer requested the State Board of Finance (the "Board of Finance") to issue state securities in one or more series, to defray the cost of the Lending Project (the "State Securities"); and

WHEREAS, by its resolution duly adopted, the Board of Finance declared its intent to issue the State Securities; and

WHEREAS, the Authority intends to hereby authorize the issuance of Municipal Securities, such Municipal Securities to bear interest at the same rates as the issue of State Securities for the purpose of providing funds, among other things, to purchase the Municipal Securities; and

WHEREAS, the Bond Bank Act permits Municipal Securities sold at private sale to the State; and

WHEREAS, after private negotiation pursuant to the Bond Bank Act, the Board has determined to sell its "Southern Nevada Water Authority, Nevada, Water Revenue Refunding Bonds, Series 2013" (the "Bonds") to the State upon the terms provided below and in the certificate to be executed by the Treasurer of the Authority on or before the date of delivery of the Bonds, accepting the offer of the State to purchase the Bonds, setting forth the aggregate principal amount of the Bonds (not to exceed \$23,000,000), the principal amount of the Bonds maturing in each year and the interest rates therefor (the "Certificate of the Treasurer"); and

WHEREAS, the Bonds may be evidenced either by serial registered bonds, maturing as provided herein, or by a single registered bond, and the term "Bonds" herein shall, unless the context otherwise requires, refer to either such serial bonds or such single registered bond, whichever evidences the Bonds; and

WHEREAS, the effective interest rate on the Bonds may not exceed by more than 3% the "Index of Revenue Bonds" which was most recently published in The Bond Buyer before a negotiated offer herein is accepted for the Bonds; and

WHEREAS, the Board hereby elects to have the provisions of Chapter 348 of NRS (the "Supplemental Bond Act") apply to the Bonds; and

WHEREAS, the Board has determined and hereby declares:

A. It is necessary and for the best interests of the Authority that it issue the Bonds; and

B. Each of the limitations and other conditions to the issuance of the Bonds in the SNWA Agreements (hereinafter defined), the Supplemental Bond Act and in any other relevant act of the State of Nevada or the United States has been met.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE SOUTHERN NEVADA WATER AUTHORITY DOES HEREBY RESOLVE, DETERMINE AND ORDER:

SECTION 1. Short Title. This Resolution shall be known and may be cited as the "2013 Revenue Refunding Bond Resolution."

SECTION 2. Definitions. In addition to the terms defined elsewhere in this Resolution, the terms in this Section defined shall have the meanings herein specified unless the context by clear implication otherwise clearly requires:

(1) "Bond Requirements" means the principal of, any prior redemption premiums due in connection with, and the interest on the Bonds, as such principal, premiums and interest become due at maturity or on a redemption date, or otherwise.

(2) "County Bonds" means the:

(a) Southern Nevada Water Authority, Nevada Water Revenue Refunding Bond, Series 2006;

(b) Southern Nevada Water Authority, Nevada Water Revenue Bond, Series 2006;

(c) Southern Nevada Water Authority, Nevada Water Revenue Bond, Series 2008;

(d) Southern Nevada Water Authority, Nevada Water Revenue Refunding Bond, Series 2009;

(e) Southern Nevada Water Authority, Nevada Water Revenue Refunding Bond, Series 2012; and

(f) Any other obligations of the Authority issued to the Clark County Bond Bank with a lien on the Pledged Revenues on a parity with the County Bonds.

(3) "CRC Bond Issuance Agreement" means collectively the Bond Issuance Agreements between SNWA and the Colorado River Commission of Nevada relating to the CRC Bonds.

(4) "CRC Bonds" means the State of Nevada Colorado River Commission General Obligation (Limited Tax) (Revenue Supported) Refunding Bonds, Series 2005I, and the State of Nevada Colorado River Commission General Obligation (Limited Tax) (Revenue Supported) Refunding Bonds, Series 2005H (collectively, the "2005 CRC Refunding Bonds"), the State of Nevada Colorado River Commission General Obligation (Limited Tax) (Revenue Supported) Refunding Bonds, Series 2006D (the "2006 CRC Refunding Bonds") and the State of Nevada Colorado River Commission General Obligation (Limited Tax) (Revenue Supported) Refunding Bonds, Series 2010B (the "2010 CRC Refunding Bonds").

(5) "District" means the Las Vegas Valley Water District, Nevada or any successor thereto.

(6) "Federal Securities" means bills, certificates of indebtedness, notes, bonds or similar securities which are direct obligations of, or the principal and interest of which securities are unconditionally guaranteed by, the United States.

(7) "General Taxes" means general (ad valorem) taxes levied by the members of the Authority as required by NRS 350A.152.

(8) "LVVWD Bond Repayment Agreement" means the SNWA/LVVWD Master Bond Repayment Agreement dated as of July 1, 1996 as amended, and the agreements dated as of January 15, 1995 and April 15, 1995 between the District and SNWA, both as amended.

(9) "LVVWD Bonds" means the Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Refunding Bonds, Series 2008B (the "2008B Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Water Bonds, Series 2009A (Taxable BABs) (the "2009A Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Water Bonds, Series 2009B (the "2009B Bonds"), ", its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Water Bonds, Series 2009C (Taxable BABs) (the "2009C Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Water and Refunding Bonds, Series 2009D (the "2009D Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Refunding Bonds, Series 2011A (the "2011A Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Refunding Bonds, Series 2011B (the "2011B Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Refunding Bonds, Series 2011C (the "2011C Bonds"), its Las Vegas Valley Water District, Nevada, General Obligation (Limited Tax) (Additionally Secured by SNWA Pledged Revenues) Water Bonds, Series 2012B (the "2012B Bonds"), its Las Vegas Valley Water District,

Nevada, General Obligation (Limited Tax) Water Commercial Paper Notes, (SNWA Revenue Supported), Series 2004A and Series 2004B (the "2004 Notes") and any other securities of the District issued on behalf of the Authority superior to, on a parity with or subordinate to any of the LVVWD Bonds.

(10) "Operation and maintenance expenses," or any phrase of similar import, means all reasonable and necessary current expenses of the Authority, paid or accrued, of operating, maintaining and repairing the SNWS Water System or of any other designated facility in connection with which such term is used; and the term includes, at the option of the Authority, except as limited by law, without limitation:

A. Engineering, auditing, reporting, legal and other overhead expenses of the various departments of the Authority directly related and reasonably allocable to the administration, operation and maintenance of the SNWS Water System;

B. Fidelity bond and property and liability insurance premiums relating to the SNWS Water System, or a reasonably allocable share of a premium of any blanket bond or policy relating to the SNWS Water System;

C. Payments to pension, retirement, health and hospitalization funds, and other insurance, and to any self-insurance fund as insurance premiums not in excess of the premiums which would otherwise be required for such insurance;

D. Any general taxes, assessments, excise taxes or other charges which may be lawfully imposed on the Authority, the SNWS Water System, revenues therefrom, or the Authority's income from or operations of any properties under its control and relating to the SNWS Water System, or any privilege in connection with the SNWS Water System or their operation;

E. The reasonable charges of any depository bank relating to the Bonds and any other securities payable from the Pledged Revenues or otherwise relating to the SNWS Water System;

F. Contractual services, professional services, salaries, other administrative expenses, and costs of materials, supplies, repairs and labor, relating to the SNWS Water System or to the issuance of the Bonds or any other securities relating to the SNWS Water System, including, without limitation, the expenses and compensation of any trustee, receiver or other fiduciary;

G. The costs incurred by the Authority in the collection and any refunds of all or any part of the Pledged Revenues;

H. Any costs of utility services furnished to the SNWS Water System by the Authority or otherwise;

I. Any lawful refunds of any Pledged Revenues;

J. All other administrative, general and commercial expenses relating to the SNWS Water System; but

(a) Excluding any allowance for depreciation;

(b) Excluding any costs of extensions, enlargements, betterments and other improvements (or any combination thereof);

(c) Excluding any reserves for major capital replacements (other than normal repairs);

(d) Excluding any reserves for operation, maintenance or repair of the SNWS Water System;

(e) Excluding any allowance for the redemption of any Bond or other security evidencing a loan or other obligation, or the payment of any interest thereon, or any prior redemption premium due in connection therewith;

(f) Excluding any liabilities incurred in the acquisition or improvement of any properties comprising any project or any existing SNWS Water System (or any

combination thereof) relating to the SNWS Water System, or otherwise; and

(g) Excluding any liabilities incurred by the Authority as the result of its negligence in the operation of the SNWS Water System or any other ground of legal liability not based on contract.

(11) "Parity Lien Obligations", "parity securities" or "parity bonds" means bonds or securities which have a lien on the Pledged Revenues that is on a parity with the lien thereon of the Bonds, the 1998 Revenue Bond, the loan agreements between the Authority and the State of Nevada Revolving Fund dated September 1, 1999 and June 29, 2001, the Southern Nevada Water Authority Revenue Refunding Bond, Series 2005F, the Southern Nevada Water Authority Water Revenue Bond, Series 2009, and any additional obligations, bonds or securities which have a lien on the Pledged Revenues that is on a parity with the lien thereon of the Bonds.

(12) "Pledged Revenues" means all revenues from the SNWS Water System, including revenues, charges or fees for commodities and services rendered by or through the SNWS Water System, including, without limitation, connection fees, tap fees, flat fees, meter charges and all other charges made for services, water or other commodities furnished by the SNWS Water System however denominated, and including, without limitation, the charges designated as the "Connection Charge", "Commodity Charge", "Wholesale Delivery Charge", as described in the SNWS Operating Agreement, and "Assessments" provided in Section 6.2.6 thereof, and all other amounts received, directly or indirectly, under the SNWS Operating Agreement.

(13) "Purchaser" means the Treasurer of the State of Nevada, as administrator of the municipal bond bank of the State.

(14) "Paying Agent" means the Authority's Treasurer, Las Vegas, Nevada, or any successor serving as paying agent for the Bonds.

(15) "Registered owner" means the person in whose name a Bond shall be registered on the records of the Authority kept for that purpose by the Registrar in accordance with the provisions of this Resolution.

(16) "Registrar" means the Authority's Treasurer, Las Vegas, Nevada, or any successor serving as registrar for the Bonds.

(17) "Regular Record Date" means the fifteenth day of the calendar month next preceding each interest payment date.

(18) "Single Bond" means the single registered, negotiable water revenue bond issued hereunder in lieu of serial bonds.

(19) "SNWA Agreements" means the SNWA Cooperative Agreement dated July 25, 1991, as amended, and the SNWS Operating Agreement effective as of January 1, 1996, as amended.

(20) "SNWS Operating Agreement" means the SNWA Facilities and Operating Agreement effective as of January 1, 1996, as amended.

(21) "SNWS Water System" means, without limitation, the Southern Nevada Water System as defined in the SNWS Operating Agreement, and all additions, improvements and extensions to any part of the SNWS Water System.

(22) "Special Record Date" means a special date fixed by the Paying Agent to determine the names and addresses of registered owners of the Bonds for the payment of any defaulted interest on any Bonds, as further provided in Section 14 hereof.

(23) "State" means the State of Nevada.

(24) "Superior Lien Obligations," "superior securities" or "superior bonds" means all of the following whether presently outstanding or issued or incurred in the future:

(A) Bonds or securities which have a lien on the Pledged Revenues that is superior to the lien thereon of the Bonds, including but not limited to the County Bonds, the LVVWD Bonds, and the CRC Bonds;

(B) Payments to the Federal Government for the cost of the construction of the facilities allocated by the Secretary of the Interior for reimbursement pursuant to any contracts therefor;

(C) Payments of compensation and expenses of SNWA and all other obligations incurred through performance by SNWA of the duties designated in sections 2 and 7 of Chapter 393, Statutes of Nevada 1995;

(D) Payments of the principal, interest and any other charges related to any obligations incurred to refund any general obligations of the State issued for the acquisition, construction, improvement or equipment of the Federal facilities or the State facilities, including, but not limited to, the "Bond Obligation Agreement" dated as of September 15, 1997 between the State and SNWA, as amended;

(E) Payments of the principal, interest and any other charges related to any obligations which have a lien on the Pledged Revenues superior to the lien thereon of the Bonds incurred by SNWA for the acquisition, construction, improvement or equipment of the Federal facilities or the State facilities or other facilities designed to provide water to southern Nevada, including, without limitation the "Bond Issuance Agreement" dated as of September 15, 1997, as amended between the State and the SNWA, the LVVWD Bond Repayment Agreement; and

(F) Any obligations issued to refund all or any portion of any of the foregoing.

(25) "Tax Code" means the Internal Revenue Code of 1986, as amended to the date of delivery of the Bonds.

SECTION 3. Sale of Bonds. The sale of the Bonds to the Purchaser on the terms and conditions provided herein is hereby approved.

SECTION 4. Ratification. All action heretofore taken by the Board, the officers of the Authority and SNWA directed toward the Project and toward the issuance, sale and delivery of the Bonds, including but not limited to requesting the Clark County Debt Management Commission to approve the Authority's proposal to issue the Bonds, is ratified, approved and confirmed.

SECTION 5. Estimated Life of Facilities. The Board, on behalf of the Authority and SNWA, has determined and does hereby declare:

A. The estimated life or estimated period of usefulness of the Project to be refinanced with the Bonds is not less than 16 years; and

B. The Bonds shall mature at such time or times not exceeding such estimated life or estimated period of usefulness.

SECTION 6. Necessity of Project and Bonds. It is necessary and in the best interests of the Board, SNWA, its officers, and the inhabitants of the County that the Authority effect the Project and defray wholly or in part the cost thereof by the issuance of the Bonds; and it is hereby so determined and declared.

SECTION 7. Authorization of Project. The Board hereby authorizes the Project.

SECTION 8. Resolution to Constitute Contract. In consideration of the purchase and the acceptance of the Bonds by those who shall own the same from time to time, the provisions hereof shall be deemed to be and shall constitute a contract between the Authority and the registered owners from time to time of the Bonds.

SECTION 9. Bonds Equally Secured. The covenants and agreements herein set forth to be performed shall be for the equal benefit, protection and security of the registered owners of any and all of the outstanding Bonds, all of which, regardless of the time or times of their issue or maturity, shall be of equal rank without preference, priority or distinction except as otherwise expressly provided in or pursuant to this Resolution.

SECTION 10. Special Obligations. All of the Bonds, as to the Bond Requirements, shall constitute special obligations of the Authority, which hereby pledges its Pledged Revenues for their payment. The Bonds are payable solely from the Pledged Revenues, and do not constitute outstanding indebtedness of the Authority, nor exhaust its debt-incurring power under any debt limitation. None of the covenants, agreements, representations and warranties contained in this Resolution shall ever impose or be construed as imposing any liability, obligation or charge against the Authority (except the Pledged Revenues) or against the general credit of the Authority, payable out of the general fund of the Authority, or out of any funds derived from taxation, except General Taxes.

SECTION 11. Limitations upon Security. The payment of the Bonds is not secured by an encumbrance, mortgage or other pledge of property of the Authority and no property of the Authority shall be liable to be forfeited or taken in payment of the Bonds; but the payment of the Bonds is secured by the Pledged Revenues hereinafter pledged for the payment of the Bonds.

SECTION 12. No Recourse Against Officers and Agents. No recourse shall be had for the payment of the Bond Requirements of the Bonds or for any claim based thereon or otherwise

upon this Resolution authorizing their issuance or any other instrument relating thereto, against any individual member of the Board or any officer or other agent of the Board, the Authority, past, present or future, either directly or indirectly through the Board, the Authority or otherwise, whether by virtue of any constitution, statute or rule of law, or by the enforcement of any penalty or otherwise, all such liability, if any, being by the acceptance of the Bonds and as a part of the consideration of their issuance specially waived and released.

SECTION 13. Authorization of Bonds. For the purpose of providing funds to pay all or a portion of the cost of the Project, the Authority shall issue the "Southern Nevada Water Authority, Nevada, Water Revenue Refunding Bonds, Series 2013" in the aggregate principal amount as set forth in the Certificate of the Treasurer (not to exceed \$23,000,000). The State has requested, and the Authority has agreed, that the obligation of the Authority hereunder shall be represented in the form of a single, registered, negotiable revenue bond, i.e., the Single Bond. The registered owner thereof shall have the right to convert said Single Bond to serial registered Bonds, at its own expense. The Single Bond shall be in the form substantially as set forth in Section 28 hereof. The serial Bonds shall be in the form substantially as set forth in Section 26 hereof.

SECTION 14. Bond Details. The Bonds shall be issued in fully registered form. The Bonds shall be dated initially as of the date of delivery thereof to the State, and except as otherwise provided in Section 19 hereof shall be issued in denominations of \$5,000 or any integral multiple thereof (provided that no Bond may be in a denomination which exceeds the principal coming due on any maturity date, and no individual Bond will be issued with more than one maturity). The Bonds shall bear interest from their date until their respective maturity dates (or, if redeemed prior to maturity as provided below, their redemption dates) at the respective rates set forth in a certificate to be executed by the Treasurer or his designee on or after the date of the sale of the State Securities and on or before the date of closing on the Bonds (the "Certificate of the Treasurer"), payable semiannually on February 1 and August 1 of each year commencing on August 1, 2013; provided that those Bonds which are reissued upon transfer, exchange or other replacement shall bear interest at the rates shown below from the most recent interest payment date to which interest has been paid or duly provided for, or if no interest has been paid, from the date of the Bonds. Notwithstanding the foregoing, so long as the State is the registered owner of the Bonds, interest

payments on the Bonds shall be made by depositing an amount sufficient to make the payment then due by wire transfer to the State Treasurer in immediately available funds, not more than five days before each interest payment date and not later than each interest payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds. If the State Treasurer is still the registered owner of the Bonds, such payment not more than five days before each interest payment date and not later than each interest payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds, shall continue to be required if an escrow or trust has been established as provided in Section 47 hereof to make such payments, unless the State Treasurer otherwise agrees. The Bonds shall mature in each of the amounts of principal and on the dates as designated in the Certificate of the Treasurer.

The principal and redemption premium, if any, on any Bond shall be payable to the registered owner thereof as shown on the registration records kept by the Registrar, upon maturity or prior redemption thereof and upon presentation and surrender at the principal office of the Paying Agent or at such other office as shall be designated by the Paying Agent. Notwithstanding the foregoing, so long as the State is the registered owner of the Bonds, all principal payments shall be made by depositing with the State Treasurer, in immediately available funds, an amount sufficient to make the payment then due, not more than five days before each principal payment date and not later than each principal payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds. If the State is still the registered owner of the Bonds, such payment not more than five days before each principal payment date and not later than each principal payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds, shall continue to be required if an escrow or trust has been established as provided in Section 47 hereof to make such payment, unless the State Treasurer otherwise agrees.

If any Bond shall not be paid upon such presentation and surrender at or after maturity or prior redemption, it shall continue to draw interest at the interest rate borne by the Bond until the principal thereof is paid in full. Except as provided herein with respect to payments while the State is the owner of the Bonds and except as provided in Section 19, payment of interest on any Bond

shall be made to the registered owner thereof by check or draft mailed by the Paying Agent on each interest payment date (or, if such interest payment date is not a business day, on the next succeeding business day) to the registered owner thereof at his or her address as shown on the registration records kept by the Registrar as of the close of business on the Regular Record Date; but any such interest not so timely paid shall cease to be payable to the registered owner thereof as shown on the registration records of the Registrar as of the close of business on the Regular Record Date and shall be payable to the registered owner thereof at his or her address as shown on the registration records of the Registrar as of the close of business on the Special Record Date. Such Special Record Date shall be fixed by the Paying Agent whenever moneys become available for payment of the defaulted interest, and notice of the Special Record Date shall be given to the registered owners of the Bonds not less than ten days prior thereto by first-class mail to each such registered owner as shown on the Registrar's registration records as of a date selected by the Registrar, stating the date of the Special Record Date and the date fixed for the payment of such defaulted interest. The Paying Agent may make payments of interest on any Bond by such alternative means as may be mutually agreed to between the registered owner of such Bond and the Paying Agent. All such payments shall be made in lawful money of the United States without deduction for any service charges of the Paying Agent or Registrar.

SECTION 15. Prior Redemption or Prepayment Option.

A. Optional Redemption or Prepayment. Bonds, or portions thereof (\$5,000 or any integral multiple), or, if a Single Bond is issued as provided herein, installments of principal, maturing on or after the date set forth in the Certificate of the Treasurer shall be subject to redemption prior to their respective maturities, at the option of the Authority, on and after the date set forth in the Certificate of the Treasurer, in whole or in part at any time from any maturities selected by the Authority and by lot within a maturity (giving proportionate weight to Bonds in denominations larger than \$5,000), at a price equal to the principal amount of each Bond, or portion thereof, so redeemed, accrued interest thereon to the redemption date, and a premium, if any, as set forth in the Certificate of the Treasurer.

If a Single Bond is issued to evidence the Bonds as herein provided, installments of principal due on and after the date set forth in the Certificate of the Treasurer shall be subject to

prepayment on and after the date set forth in the Certificate of the Treasurer, or in part, at any time in amounts of \$5,000 or any multiple thereof and from any maturities as are selected by the Authority, at the same prices and terms as if such Single Bond were evidenced by the \$5,000 denomination Bonds designated above.

B. Partial Redemption. In the case of Bonds in a denomination larger than \$5,000, a portion of such Bond (\$5,000 or any integral multiple thereof) may be redeemed, in which case the Registrar shall, without charge to the owner of such Bond, authenticate and issue a replacement Bond or Bonds for the unredeemed portion thereof. In the case of a partial redemption of Bonds of a single maturity pursuant to subsection (A) hereof, the Paying Agent shall select the Bonds to be redeemed by lot at such time as directed by the Authority (but at least 30 days prior to the redemption date), and if such selection is more than 60 days before a redemption date, shall direct the Registrar to appropriately identify the Bonds so called for redemption by stamping them at the time any Bond so selected for redemption is presented to the Registrar for stamping or for transfer or exchange, or by such other method of identification as is deemed adequate by the Registrar, and any Bond or Bonds issued in exchange for, or to replace, any Bond so called for prior redemption shall likewise be stamped or otherwise identified.

SECTION 16. Notice of Redemption. Unless waived by any owner of Bonds to be redeemed, official notice of any such redemption shall be given by the Registrar, by mailing a copy of an official redemption notice by first-class mail, postage prepaid, at least 30 days and not more than 60 days prior to the date fixed for redemption to the registered owner of the Bond or Bonds to be redeemed at the address shown on the registration records of the Registrar or at such other address as is furnished in writing by such registered owner to the Registrar. If at the time of any redemption the State owns all of the then outstanding Bonds, such notice shall be given to the State Treasurer at least 75 days before the date fixed for redemption. Actual receipt of mailed notice by any owner of Bonds shall not be a condition precedent to redemption of such Bond or Bonds. Failure to give such notice to the registered owner of any Bond, or any defect therein, shall not affect the validity of the proceedings for the redemption of any other Bonds. A certificate by the Registrar that such notice has been given as herein provided shall be conclusive against all parties.

All official notices of redemption shall be dated and shall state:

- A. the redemption date,
- B. the redemption prices,
- C. if less than all outstanding Bonds are to be redeemed, the identification (and, in the case of partial redemption, the respective principal amounts) of the Bonds to be redeemed (or, if a Single Bond evidences the Bonds, the installments of principal to be repaid),
- D. that on the redemption date the redemption price will become due and payable upon each such Bond or portion thereof called for redemption (or installments of principal to be repaid), and that interest thereon shall cease to accrue from and after said date, and
- E. the place where such Bonds are to be surrendered for payment of the redemption price, which place of payment shall be the principal office of the Paying Agent (accrued interest to the redemption date being payable by mail or as otherwise provided in this Resolution).

Prior to or on any redemption date, the Authority shall deposit with the Paying Agent an amount of money sufficient to pay the redemption price of all the Bonds or portions of Bonds which are to be redeemed on that date.

Official notice of redemption having been given as aforesaid, the Bonds or portions of Bonds so to be redeemed shall, on the redemption date, become due and payable at the redemption price therein specified, and from and after such date (unless the Authority shall default in the payment of the redemption price) such Bonds or portions of Bonds shall cease to bear interest. Upon surrender of such Bonds for redemption in accordance with said notice, such Bonds shall be paid by the Paying Agent at the redemption price. Installments of interest due on or prior to the redemption date shall be payable as herein provided for payment of interest. Upon surrender for any partial redemption of any Bond, there shall be prepared for the registered owner a new Bond or Bonds of the same maturity in the amount of the unpaid principal. All Bonds which have been redeemed shall be canceled and destroyed by the Registrar and shall not be reissued. Notwithstanding the provisions of

this Section, any notice of redemption may contain a statement that the redemption is conditioned upon the receipt by the Paying Agent, on or before the date fixed for redemption, of funds sufficient to pay the redemption price of the Bonds so called for redemption, and that if such funds are not available, such redemption shall be canceled by written notice to the owners of the Bonds called for redemption in the same manner as the original redemption notice was mailed.

SECTION 17. Negotiability. Subject to the registration and payment provisions herein provided, the Bonds shall be fully negotiable within the meaning of and for the purpose of the Uniform Commercial Code - Investment Securities and each registered owner shall possess all rights enjoyed by holders of negotiable instruments under the Uniform Commercial Code - Investment Securities.

SECTION 18. Registration, Transfer and Exchange of Bonds. Except as otherwise provided in Section 19 hereof:

A. Records for the registration and transfer of the Bonds shall be kept by the Registrar. Upon the surrender of any Bond at the Registrar, duly endorsed for transfer or accompanied by an assignment in form satisfactory to the Registrar duly executed by the registered owner or his or her attorney duly authorized in writing, the Registrar shall authenticate and deliver in the name of the transferee or transferees a new Bond or Bonds of a like aggregate principal amount and of the same maturity, bearing a number or numbers not previously assigned. Bonds may be exchanged at the Registrar for an equal aggregate principal amount of Bonds of the same maturity of other authorized denominations, as provided in Section 14 hereof. The Registrar shall authenticate and deliver a Bond or Bonds which the registered owner making the exchange is entitled to receive, bearing a number or numbers not previously assigned. For every exchange or transfer of Bonds requested by the registered owner thereof, the Registrar may make a sufficient charge to reimburse it for any tax, fee or other governmental charge required to be paid with respect to such exchange or transfer and may charge a sum sufficient to pay the cost of preparing and authenticating a new Bond. No such charge shall be made in the case of an exchange resulting from an optional prior redemption of a Bond.

B. The Registrar shall not be required to transfer or exchange (i) any Bond subject to redemption during a period beginning at the opening of business 15 days before the date of

mailing by the Registrar of a notice of prior redemption of Bonds and ending at the close of business on the date of such mailing, or (ii) any Bond after the mailing of notice calling such Bond, or any portion thereof, for redemption as herein provided.

C. The person in whose name any Bond shall be registered on the registration records kept by the Registrar shall be deemed and regarded as the absolute owner thereof for the purpose of payment and for all other purposes (except to the extent otherwise provided in Section 14 hereof with respect to interest payments); and payment of or on account of either principal or interest on any Bond shall be made only to or upon the written order of the registered owner thereof or his or her legal representative. All such payments shall be valid and effectual to discharge the liability upon such Bond to the extent of the sum or sums so paid.

D. If any Bond shall be lost, stolen, destroyed or mutilated, the Registrar shall, upon receipt of such evidence, information or indemnity relating thereto as it or the Authority may reasonably require, and upon payment of all expenses in connection therewith, authenticate and deliver a replacement Bond or Bonds of a like aggregate principal amount and of the same maturity, bearing a number or numbers not previously assigned. If such lost, stolen, destroyed or mutilated Bond shall have matured or shall have been called for redemption, the Registrar may direct that such Bond be paid by the Paying Agent in lieu of replacement.

E. Whenever any Bond shall be surrendered to the Paying Agent upon payment thereof, or to the Registrar for transfer, exchange or replacement as provided herein, such Bond shall be promptly canceled by the Paying Agent or Registrar, and counterparts of a certificate of such cancellation shall be furnished by the Paying Agent or Registrar to the Board, upon request.

F. The Registrar shall maintain at his office so long as the Bonds are evidenced by a Single Bond, a registration record for the Single Bond showing the name and address of the registered owner, the amounts and dates of any principal prepayments on the Single Bond, and the dates of any transfers of the Single Bond. The Registrar shall permit at all reasonable times the transfer of ownership of the Single Bond on presentation of the Single Bond at his office together with a written request for transfer signed by the registered owner or his attorney duly authorized in writing in a form satisfactory to the Registrar. Any such transfer shall be noted on the registration record and on the registration panel on the back of the Single Bond. No transfer shall be permitted

within 30 days of any principal or interest payment date nor within 75 days of any date on which the Authority is prepaying all or any portion of the principal of the Single Bond.

G. Upon written request of the registered owner of the Single Bond or his attorney duly authorized in writing, in form satisfactory to the Paying Agent, the Authority shall issue at the registered owner's expense and within 60 days from the date of such request, definitive negotiable registered bonds in the form provided by Section 26 and in the denominations of \$5,000 each or any integral multiple thereof, requested by the registered owner, in an aggregate principal amount equal to the amount of unpaid principal of the Single Bond and of like tenor and date, and with the maturities, interest rates and terms otherwise prescribed by this Resolution for such Bonds.

SECTION 19. Use of Depository.

A. In the event the Bonds are issued as serial Bonds as provided in Section 26 hereof, the Authority may provide for the Bonds to be issued in book entry only form in which case the Bonds shall be evidenced by one Bond for each year in which the principal of the Bonds comes due, in a denomination equal to the amount of principal coming due in that year. Such Bonds shall be registered in the name of "Cede & Co." as nominee for The Depository Trust Company, the depository for the Bonds. The Bonds may not thereafter be transferred or exchanged except:

(1) To any successor of The Depository Trust Company or its nominee which successor must be both a "clearing corporation" as defined in NRS 104.8102, and a qualified and registered "clearing agency" under Section 17A of the Securities Exchange Act of 1934, as amended;

(2) Upon the resignation of The Depository Trust Company or a successor or new depository under clause (1) or this clause (2) of this Subsection A or a determination by the Board that The Depository Trust Company or such successor or new depository is no longer able to carry out its functions and the designation by the Board of another depository institution, acceptable to the Board which must be both a "clearing corporation" as defined in NRS 104.8102 and a qualified and registered "clearing agency" under Section 17A of the Securities Exchange Act of 1934, as amended, to carry out the functions of The Depository Trust Company or such successor or new depository; or

B. Upon the resignation of The Depository Trust Company or a successor depository or new depository under clause (1) or (2) of this Subsection A or a determination by the Board that The Depository Trust Company or such successor or new depository is no longer able to carry out its functions and the failure by the Board, after reasonable investigation, to locate another qualified depository institution acceptable to the Board under clause (2) to carry out the functions of The Depository Trust Company or such successor or new depository. In the case of a transfer to a successor of The Depository Trust Company or its nominee as referred to in clause (1) of subsection A hereof or in the case of designation of a new depository pursuant to clause (2) of subsection A hereof upon receipt of the outstanding Bonds by the Registrar, together with written instructions for transfer satisfactory to the Registrar, a single new Bond shall be issued to such successor or new depository, as the case may be, for each maturity of the Bonds then outstanding, registered in the name of such successor or new depository, as the case may be, or its nominee, as is specified in such written transfer instructions. In the case of a determination under clause (2) of subsection A hereof and the failure, after reasonable investigation to locate another depository institution for the Bonds acceptable to the Board and upon receipt of outstanding Bonds by the Registrar together with written instructions for transfer satisfactory to the Registrar, new Bonds shall be issued in the denominations of \$5,000 or any integral multiple thereof, as provided in and subject to the limitations of Section 14 hereof, registered in the names of such persons, and in such denominations as are requested in such written transfer instructions; however, the Registrar shall not be required to deliver such new Bonds within a period of less than 60 days from the date of receipt of such written transfer instructions.

C. The Authority shall be entitled to treat the registered owner of any Bond as the absolute owner thereof for all purposes of this resolution and any applicable laws notwithstanding any notice to the contrary received by the Registrar or the Authority and the Authority shall have no responsibility for transmitting payments to the beneficial owners of the Bonds held by The Depository Trust Company or any successor or new depository named pursuant to subsection A hereof.

D. The Authority and the Registrar shall endeavor to cooperate with The Depository Trust Company or any successor or new depository named pursuant to clause (1) or (2) of subsection A hereof in effectuating payment of the Bond Requirements of the Bonds by arranging for

payment in such a manner that funds representing such payments are available to the depository on the day they are due.

SECTION 20. Execution and Authentication.

A. If facsimile signatures will be used on the Bonds, prior to the execution of any Bonds, pursuant to the act known as the Uniform Facsimile Signatures of Public Officials Act, cited as Chapter 351, NRS, and to the Supplemental Bond Act, the Chairman of the Authority (the "Chairman"), the Authority Treasurer and the Authority Secretary (the "Secretary") shall each file with the Secretary of State of Nevada his or her manual signature certified by him or her under oath.

B. The Bonds shall be approved, signed and executed in the name of and on behalf of the Authority with the manual or facsimile signature of the Chairman, shall be countersigned and executed with the manual or facsimile signature of the Treasurer and shall bear a manual impression or a facsimile of an impression of the official seal of the Authority attested with the manual or facsimile signature of the Secretary.

C. No Bond shall be valid or obligatory for any purpose unless the certificate of authentication thereon, substantially in the form hereinafter provided or, in the case of a Single Bond, the registration panel, substantially in the form hereinafter provided, has been duly manually executed by the Registrar. The Registrar's certificate of authentication shall be deemed to have been duly executed by it if manually signed by an authorized officer or employee of the Registrar, but it shall not be necessary that the same officer sign the certificate of authentication on all of the Bonds issued hereunder. By authenticating any of the Bonds initially delivered pursuant to this Resolution, the Registrar shall be deemed to have assented to all of the provisions of this Resolution.

SECTION 21. Use of Predecessor's Signature. The Bonds bearing the signatures of the officers in office at the time of the execution of the Bonds shall be valid and binding obligations of the Authority, notwithstanding that before their delivery any or all of the persons who executed them shall have ceased to fill their respective offices. The Chairman, the Treasurer and the Secretary, at the time of the execution of a signature certificate relating to the Bonds, may each adopt as and for his or her own facsimile signature the facsimile signature of his or her predecessor in office if such facsimile signature appears upon any of the Bonds.

SECTION 22. Recital of Authority to Issue the Bonds. The Bonds are issued in conformance with the SNWA Agreements and the Authority Act, and the members of the Authority have contracted with the Authority in the SNWS Operating Agreement to make payments from the revenues of the water systems of the members of the Authority, which in the aggregate are fully sufficient to pay the Bond Requirements of the Bonds; and therefore, the Board is authorized to issue the Bonds.

SECTION 23. Additional Security. The Bonds are additionally secured as provided in the second and third sentences of NRS 350A.152(1)(b).

SECTION 24. Bond Execution. The Chairman, the Treasurer and the Secretary are hereby authorized and directed to prepare and to execute the Bonds as herein provided.

SECTION 25. Registration. The Registrar shall maintain the registration records of the Authority for the Bonds, showing the name and address of the owner of each Bond authenticated and delivered, the date of authentication, the maturity of the Bond, and its interest rate, principal amount and Bond number.

SECTION 26. Serial Bond Form. Subject to the provisions of this Resolution, the serial Bonds shall be in substantially the following form with such omissions, insertions, endorsements and variations as may be required by the circumstances, be required or permitted by this Resolution, or be consistent with this Resolution and necessary or appropriate to conform to the rules and requirements of any governmental authority or any usage or requirement of law with respect thereto:

(Form of Serial Bond)

TRANSFER OF THIS BOND OTHER THAN BY REGISTRATION IS NOT EFFECTIVE

**SOUTHERN NEVADA WATER AUTHORITY, NEVADA
REVENUE REFUNDING BOND
SERIES 2013**

No. _____ \$ _____

Interest Rate Maturity Date Dated As of CUSIP
_____ % _____ 1, _____ _____

REGISTERED OWNER:

PRINCIPAL AMOUNT: _____ **DOLLARS**

The Southern Nevada Water Authority, Nevada, a public corporation in Clark County, in the State of Nevada (the "Authority" and the "State", respectively) for value received, hereby promises to pay to the Registered Owner specified above, or registered assigns, the Principal Amount specified above, on the Maturity Date specified above (unless called for earlier redemption) and to pay interest thereon on February 1 and August 1 of each year, commencing on August 1, 2013, at the Interest Rate per annum specified above, until the principal sum is paid or payment has been provided for. This Bond shall bear interest from the most recent interest payment date to which interest has been paid or, if no interest has been paid, from the date of this Bond. The principal on this Bond is payable upon presentation and surrender hereof at the principal office of the Authority's paying agent (the "Paying Agent") or at such other office as may be designated by the Paying Agent, presently the Authority's Treasurer, in Las Vegas, Nevada, who is also now acting as the Authority's Registrar (the "Registrar"). Interest on this Bond will be paid on each interest payment date (or, if such date is not a business day, on the next succeeding business day) by check or draft mailed to the person in whose name this Bond is registered (the "registered owner") in the registration records of the Authority maintained by the Registrar, at the address appearing thereon, as of the close of business on the fifteenth day of the calendar month next preceding such interest payment date (the "Regular Record Date"). Any such interest not so timely paid shall cease to be payable to the person who is the registered owner as of the close of business on the Regular Record Date and shall be payable to the person who is the registered owner as of the close of business on a special record date for the payment of any defaulted interest (the "Special Record Date"). Such Special Record Date shall be fixed by the Paying Agent whenever moneys become available for payment of the defaulted interest, and notice of the Special Record Date shall be given to the registered owner not less than ten

(10) days prior thereto. If the payment of any installment of principal of this Bond is not made when due, interest on such installment shall continue at the interest rate for such installment referred to above until such principal installment is paid in full. All such payments shall be made in lawful money of the United States without deduction for any service charges of the Paying Agent or Registrar.

This Bond may not be exchanged or transferred except in circumstances specified in Section 19 of the resolution of the Board of Directors of the Authority (the "Board") authorizing the issuance of the Bonds of the series of which this Bond is one (the "Bonds") and designated in Section 1 thereof as the "2013 Revenue Refunding Bond Resolution" (the "Resolution") and only at the times and subject to payment of the charges specified in the Resolution.

The Authority, the Registrar and the Paying Agent may deem and treat the person in whose name this Bond is registered as the absolute owner hereof for the purpose of payment and for all other purposes, except to the extent otherwise provided hereinabove and in the Resolution with respect to Regular and Special Record Dates for the payment of interest.

The Bonds maturing on and after the date set forth in the Certificate of the Treasurer are subject to redemption prior to their respective maturities at the option of the Authority on and after the date set forth in the Certificate of the Treasurer in whole or in part (\$5,000 or any integral multiple thereof) at any time from such maturity or maturities selected by the Board, and by lot within a maturity (giving proportionate weight to Bonds in denominations larger than \$5,000), at a price equal to the principal amount of each Bond, or portion thereof, so redeemed and accrued interest thereon to the redemption date, plus a premium, if any, as set forth in the Certificate of the Treasurer.

Notice of redemption, unless waived, will be given by the Registrar by mailing a redemption notice by first class mail at least 30 days and not more than 60 days prior to the date fixed for redemption addressed to the registered owner of the Bond or Bonds to be redeemed at the address shown on the registration records kept by the Registrar. Notice of redemption having been given as aforesaid, the Bonds or portions thereof so called for redemption and for which payment has been provided shall, on the redemption date, become due and payable at the redemption price therein specified, and from and after such date such Bonds or portions thereof shall cease to bear interest.

This Bond must be registered in the name of the registered owner as to both principal and interest on the registration records kept by the Registrar in conformity with the provisions stated herein and endorsed hereon and subject to the terms and conditions set forth in the Resolution. No transfer of this Bond shall be valid unless made on the registration records maintained at the principal office of the Registrar by the registered owner or his or her attorney duly authorized in writing.

The Bonds are issued by the Authority upon its behalf and upon the credit thereof for the purpose of refunding certain of the Authority's outstanding bonds (the "Project"), all as more

fully described in the Resolution, under the authority of and in full compliance with the Constitution and laws of the State and pursuant to the Resolution.

It is hereby certified, recited and warranted that all the requirements of law have been fully complied with by the proper officers of the Authority in the issuance of this Bond. This Bond is issued pursuant to the interlocal agreements described in the Resolution entered into pursuant to the provisions of Chapter 277 (the "Authority Act") of the Nevada Revised Statutes ("NRS"), as amended and supplemented and pursuant to NRS Chapter 348.

Payment of the principal and interest on the Bonds (the "Bond Requirements") is secured by a pledge of revenues, (herein, the "Pledged Revenues") derived by the Authority, as more specifically provided in the Resolution.

The Bonds are equally and ratably secured by such pledge of the Pledged Revenues, and such pledge constitutes an irrevocable lien (but not necessarily an exclusive lien) upon the Pledged Revenues, subject to the superior or parity liens of any obligations issued superior to or on a parity with the Bonds. Additional securities and other obligations may be issued, incurred and made payable from Pledged Revenues having a lien thereon superior to, subordinate to or on a parity with such pledge, in each case subject to the conditions of and in accordance with the Resolution.

This Bond is also secured as provided in the second and third sentences of NRS 350A.152(1)(b).

Reference is made to the Resolution for an additional description of the nature and extent of the security for this Bond, the accounts, funds, or revenues pledged, the nature and extent and manner of enforcement of the pledge, the rights and remedies of the registered owner of this Bond with respect thereto, the terms and conditions upon which this Bond is issued, and a statement of rights, duties, immunities, and obligations of the Authority, and other rights and remedies of the owners of this Bond.

To the extent and in the respects permitted by the Resolution, the provisions of the Resolution may be amended or otherwise modified by action of the Authority taken in the manner and subject to the conditions and exceptions prescribed in the Resolution. The pledge of Pledged Revenues under the Resolution may be discharged at or prior to the respective maturities or prior redemption of the Bonds upon the making of provision for the payment thereof on the terms and conditions set forth in the Resolution.

No recourse shall be had for the payment of the Bond Requirements of this Bond or for any claim based thereon or otherwise in respect to the Resolution or other instrument pertaining thereto against any individual member of the Board, or any officer or other agent of the Authority, past, present, or future, either directly or indirectly through the Board, or the Authority or otherwise, whether by virtue of any constitution, statute or rule of law, or by the enforcement of any penalty or

otherwise, all such liability, if any, being by the acceptance of this Bond and as a part of the consideration of its issuance specially waived and released.

This Bond shall not be valid or obligatory for any purpose until the Registrar shall have manually signed the certificate of authentication hereon.

IN WITNESS WHEREOF, the Board of Directors of the Southern Nevada Water Authority in the County of Clark and State of Nevada, on behalf of the Southern Nevada Water Authority, has caused this Bond to be executed in its name with the manual or facsimile signature of the Chairman of its Board of Directors, to be attested, signed and executed with a manual or facsimile signature of the Secretary of the Board of Directors, has caused a manual or facsimile impression of the seal of the Authority to be affixed hereon, and has caused this Bond to be countersigned with the manual or facsimile signature of the Authority Treasurer, all as of _____, 2013.

SOUTHERN NEVADA WATER AUTHORITY

By: (Manual or Facsimile Signature)
Chairman, Board of Directors
Southern Nevada Water Authority
Clark County, Nevada

Countersigned:

(MANUAL OR FACSIMILE
AUTHORITY SEAL)

Attest:

(Manual or Facsimile Signature)
Authority Treasurer
Southern Nevada Water Authority
Clark County, Nevada

(Manual or Facsimile Signature)
Secretary, Board of Directors
Southern Nevada Water Authority
Clark County, Nevada

(End of Form of Bond)

(Form of Prepayment Panel)

The following installments of principal (or portions thereof) of this Bond have been prepaid by the Authority, in accordance with the terms of the Resolution authorizing the issuance of this Bond.

<u>Date of Prepayment</u>	<u>Principal</u>	<u>Signature of Authorized Representative of DTC</u>

(End of Form of Prepayment Panel)

(Form of Assignment for Serial Bond)

For value received, the undersigned hereby sells, assigns and transfers unto _____ the within Bond and hereby irrevocably constitutes and appoints _____ attorney, to transfer the same on the record kept for registration of the within Bond, with full power of substitution in the premises.

Dated: _____

Date Guaranteed:

Name of Transferee:

Address of Transferee:

Social Security or other tax
identification number of
Transferee:

NOTE: The signature to this Assignment must correspond with the name as written on the face of the within Bond in every particular, without alteration or enlargement or any change whatsoever.

(End of Form of Assignment)

SECTION 27. Use of Single Bond. Notwithstanding the foregoing provision, the Bonds shall be initially evidenced by a single registered Bond, numbered R-1, which Single Bond shall be manually signed and executed in the name of and on behalf of the Authority by the Chairman, countersigned and manually subscribed by the Treasurer, with the seal of the Authority affixed thereto and attested and manually signed by the Secretary. The principal installments, interest and any prior redemption premiums on the Single Bond shall be paid by check, draft or warrant made to the order of the registered owner of the Single Bond and mailed to the address of the registered owner shown on the Bond registration records of the Paying Agent on or before such payment date, or if such payment date is not a business day, on or before the next succeeding business day. Notwithstanding the foregoing, so long as the State is the registered owner, such payment shall be made by depositing by wire transfer to the State Treasurer, in immediately available funds, an amount sufficient to make the payment then due, not more than five days before each payment date and not later than each payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds. If the State is still the registered owner of the Bonds, such payment not more than five days before each payment date and not later than each payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds, shall continue to be required if an escrow or trust has been established as provided in Section 47 hereof to make such payment, unless the State Treasurer otherwise agrees.

The final installment of principal on the Single Bond shall be made only upon surrender of the Single Bond at the office of the Paying Agent. The Single Bond shall mature in installments of principal, bear interest and be subject to prepayments of installments of principal, substantially as provided in Sections 14 through 25 hereof. If a portion of principal of the Single Bond is called for prior redemption, no payment of the principal or redemption price or interest on the Single Bond, due on or after the date fixed for redemption shall be made unless the Single Bond is presented to the Paying Agent and notation of the installments of principal so called for prior redemption is made on such Single Bond. The Single Bond must be registered in the name of its owner and may be assigned by the registered owner in the manner and with the effect set forth in the provisions for registration contained in the form thereof hereinafter set forth. The Authority shall

pay to the State such amounts as are necessary to pay the Authority's share of the State's cost of paying the State Securities which are issued to fund the Bonds, including without limitation the Authority's share of paying agent fees.

SECTION 28. Form of Single Bond. The Single Bond shall be in substantially the following form, said form to be completed with necessary or appropriate variations, insertions, omissions, or endorsements consistent with the provisions of this Resolution:

(Form of Single Bond)

TRANSFER OF THIS BOND OTHER THAN BY REGISTRATION IS NOT EFFECTIVE

**SOUTHERN NEVADA WATER AUTHORITY, NEVADA
REVENUE REFUNDING BOND
SERIES 2013**

No. R-1

\$ _____

The Southern Nevada Water Authority (the "Authority"), a public corporation in Clark County, (the "County"), in the State of Nevada (the "State") for value received hereby acknowledges itself to be indebted and promises to pay to the State of Nevada, c/o the State Treasurer, as Administrator of the Municipal Bond Bank, or registered assigns, the original principal sum of

_____ DOLLARS (\$ _____)

in installments of principal in the amounts and years as provided in the resolution authorizing the issuance of the Bonds adopted by the Board of Directors of the Authority (the "Board") and designated in section 1 thereof as the "2013 Revenue Refunding Bond Resolution" (the "Resolution") in lawful money of the United States of America, together with interest on the unpaid installments of principal from the date of delivery of this Bond appearing below until payment of such installments of principal shall have been discharged as provided in the Resolution, at the interest rates designated in the Resolution and the Certificate of the Treasurer for such installments appearing in the Resolution, said interest being payable on February 1 and August 1 of each year commencing on August 1, 2013, and said installments of principal bearing interest at the rates, and being payable on the dates and in amounts as designated in the Resolution and the Certificate of the Treasurer.

The principal of, interest on and any prior redemption premiums due in connection with this Bond (the "Bond Requirements") are payable by check, draft or warrant made to the order of the registered owner hereof and mailed by the Treasurer of the Authority or any successor thereto as paying agent for this Bond (the "Paying Agent") to the address shown for the registered owner on the registration records of the Treasurer of the Authority or any successor thereto as registrar for the Bond (the "Registrar"). Notwithstanding the foregoing, so long as the State is the registered owner, such payment shall be made by depositing with the State Treasurer, in immediately available funds, not more than five days before each payment date and not later than each payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds, an amount sufficient to make the payment then due. If the State is still the registered owner of the Bonds, such payment not more than five days before such payment date and not later than each payment date, as mutually agreed to by the State Treasurer and the Treasurer and evidenced by a certificate of the Treasurer dated on or before issuance of the Bonds, shall continue to be required if an escrow or trust has been established as provided in Section 47 of the Resolution to make such payment, unless the State Treasurer otherwise agrees. If any

payment date is not a business day, payment may be made on or before the next succeeding business day. If payment of any installment of principal of this Bond is not made when due, interest on such installment shall continue at the interest rate for such installment specified in the Resolution until such principal installment is paid in full. The final installment of principal on this Bond is payable only on presentation and surrender of this Bond at the office of the Paying Agent.

This single bond is one of a duly authorized issue of bonds of the Authority (the "Bond") to refund certain outstanding bonds of the Authority (the "Project"), as more fully described in the Resolution, under the authority of and in full compliance with the constitution and laws of the State, and pursuant to the Resolution.

This Bond is issued pursuant to the interlocal agreements described in the Resolution entered into pursuant to the provisions of Chapter 277 (the "Authority Act"), Nevada Revised Statutes, as amended and supplemented; Nevada Revised Statutes ("NRS") chapter 348 (the "Supplemental Bond Law").

Installments of principal of the Bonds maturing on or before the date set forth in the Certificate of the Treasurer are subject to payment prior to their due dates, at the option of the Authority on and after the date set forth in the Certificate of the Treasurer, in whole or in part, at any time in amounts of \$5,000 or any multiple thereof from any maturities selected by the Authority, at a price equal to the principal amount prepaid, accrued interest to the prepayment date, and a premium, if any, as set forth in the Certificate of the Treasurer.

Prepayment shall be made on not less than 30 days' prior mailed notice in the manner and upon the conditions provided in the Resolution; provided, however, if the State of Nevada is the owner hereof not less than 75 days prior mailed notice of any prepayment shall be given. If a prepayment is made on the Bond as specified in the Resolution, interest shall cease to accrue on the amount prepaid from and after the date fixed for prepayment. If a portion of the principal of the Bond is called for prepayment, no payment of the principal of, interest on or prior redemption premium due in connection with the Bond due on and after the prepayment date shall be made unless this Bond is presented to the Paying Agent and notation of the installments of principal so called for prepayment panel appended hereto.

It is hereby certified and recited that all of the requirements of law have been fully complied with by the proper officers of the Authority in the issuance of this Bond. Payment of the principal of and interest on this Bond (the "Bond Requirements") is secured by a pledge of the revenues (herein called the "Pledged Revenues") derived by the Authority, as more specifically provided in the Resolution.

The Bonds are equally and ratably secured by such pledge of the Pledged Revenues, and such pledge constitutes an irrevocable lien (but not necessarily an exclusive lien) upon the Pledged Revenues, subject to the superior or parity liens of any obligations issued superior to or on a parity with the Bonds. Additional securities and other obligations may be issued, incurred and made

payable from Pledged Revenues having a lien thereon superior to, subordinate to or on a parity with such pledge, in each case subject to the conditions of and in accordance with the Resolution.

This Bond is also secured as provided in the second and third sentences of NRS 350A.152(1)(b).

Reference is made to the Resolution for an additional description of the nature and extent of the security for the Bonds, the accounts, funds, or revenues pledged, the nature and extent and manner of enforcement of the pledge, the rights and remedies of the registered owners of the Bonds with respect thereto, the terms and conditions upon which the Bonds are issued, and a statement of rights, duties, immunities, and obligations of the Authority, and other rights and remedies of the owners of the Bonds.

To the extent and in the respects permitted by the Resolution, the provisions of the Resolution may be amended or otherwise modified by action of the Authority taken in the manner and subject to the conditions and exceptions prescribed in the Resolution. The pledge of Pledged Revenues under the Resolution may be discharged at or prior to the respective maturities or prior redemption of the Bonds upon the making of provision for the payment thereof on the terms and conditions set forth in the Resolution.

This Bond shall not be entitled to any benefits under the Resolution, or be valid or obligatory for any purpose until the registration panel appended hereto shall have been manually signed on behalf of the Registrar.

This Bond is fully transferable by the registered owner hereof, in person or by his attorney duly authorized in writing, at said office of the Registrar, but only in the manner, subject to the limitations and upon payment of the charges, if any, provided in the Resolution, and upon surrender of this Bond together with a duly executed written instrument of transfer satisfactory to the Registrar. Any such transfer shall be noted in the registration records of the Authority maintained by the Registrar and noted on the registration panel appended hereto. The Registrar shall not be required to register the transfer of this Bond during the seventy-five days next preceding any date fixed for the prepayment of principal installments or during the thirty days next preceding any date for the payment of principal of or interest on this Bond.

No transfer of this Bond shall be valid unless made on the registration records maintained at the principal office of the Registrar by the registered owner or his or her attorney duly authorized in writing.

No recourse shall be had for the payment of the Bond Requirements of this Bond or for any claim based thereon or otherwise in respect to the Resolution, against any individual member of the Board, or any officer or other agent of the Authority or, past, present or future, either directly or indirectly through the Board, the Authority, or otherwise, whether by virtue of any constitution, statute or rule of law, or by the enforcement of any penalty or otherwise, all such liability, if any,

being by the acceptance of this Bond and as a part of the consideration of its issuance specially waived and released.

IN WITNESS WHEREOF, the Board of Directors of the Southern Nevada Water Authority, Clark County, Nevada, on behalf of the Southern Nevada Water Authority, has caused this Bond to be executed in its name by the manual or facsimile signature of the Chairman of the Board and by the manual or facsimile signature of its Authority Treasurer, and attested by the manual or facsimile signature of its Board Secretary and has caused the seal of the Authority to be reproduced hereon, all as of _____, 2013, i.e., the date of delivery of the Bond.

SOUTHERN NEVADA WATER AUTHORITY
CLARK COUNTY, NEVADA

By _____ (Manual or Facsimile Signature)
Chairman, Board of Directors
Southern Nevada Water Authority

Countersigned:

(SEAL)

Attest:

By _____ (Manual or Facsimile Signature)
Authority Treasurer
Southern Nevada Water Authority

(Manual or Facsimile Signature)
Secretary
Board of Directors
Southern Nevada Water Authority

(End of Form of Single Bond)

(Form of Registration Panel for Single Bond)

MANDATORY REGISTRATION FOR PAYMENT
AS TO PRINCIPAL AND INTEREST

The within single bond is registered in the office of the Authority Treasurer, as Registrar in the name of the last owner listed below, and the principal amount of the bond and interest thereon shall be payable only to such owner, all in accordance with the within-mentioned Resolution.

<u>Date of Registration</u>	<u>Name of Owner</u>	<u>Address of Owner</u>	<u>Signature of Registrar</u>
_____	State of Nevada, c/o State Treasurer, as Administrator of the Municipal Bond Bank of the State of Nevada	State Treasurer 101 N. Carson St., Suite #4 Carson City, Nevada 89710	_____
_____	_____	_____	_____
_____	_____	_____	_____

(End of Form of Registration Panel)

(Form of Principal Prepayment Panel on Single Bond)

PREPAYMENT PANEL

The following installments of principal (or portions thereof) of this Single Bond have been prepaid by the Southern Nevada Water Authority, Clark County, Nevada, in accordance with the terms of the within-mentioned Resolution.

<u>Date of Prepayment</u>	<u>Due Date of Installments (or portions thereof)</u>	<u>Principal Amount Prepaid</u>	<u>Signature of Paying Agent</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(End of Form of Principal Prepayment Panel)

(Form of Assignment for Single Bond)

For value received, the undersigned hereby sells, assigns and transfers unto _____ the within Bond and hereby irrevocably constitutes and appoints _____ attorney, to transfer the same on the record kept for registration of the within Bond, with full power of substitution in the premises.

Dated: _____

Date Guaranteed:

Name of Transferee:

Address of Transferee:

Social Security or other tax
identification number of
Transferee:

NOTE: The signature to this Assignment must correspond with the name as written on the face of the within Bond in every particular, without alteration or enlargement or any change whatsoever.

(End of Form of Assignment)

SECTION 29. Delivery of the Single Bond; Deposit of Proceeds. When the Single Bond has been duly executed, the Treasurer shall deliver it to the State upon receipt of the agreed purchase price, together with evidence that the State Treasurer has reduced the prepayment panel appended to the Refunded Bonds in the amount being refunded by the Bonds, and shall register the Single Bond in the name of the State on the Bond registration records of the Registrar and make notation of such registration on the registration panel appended to the Single Bond. The Treasurer shall cause the proceeds of the Bonds to be applied as follows:

A. First, any accrued interest received from the sale of the Bonds and any proceeds to be used for capitalized interest shall be deposited into the Bond Fund, hereinafter created.

B. Second, the balance of the proceeds received from the sale of the Bonds shall be deposited into a special account hereby created and designated as the "Southern Nevada Water Authority, Nevada, Revenue Refunding Bond, Series 2013, Costs of Issuance Account" (the "Costs of Issuance Account") to be held by the Authority. Moneys in the Costs of Issuance Account shall be used solely to defray wholly or in part the costs of issuance of the Bonds, which the Board hereby determines are necessary and desirable and appertain to the Project. After the Project is complete and after all expenses have been paid or adequate provision therefore is made, pursuant to NRS 350.650, any unexpended balance of Bond proceeds (or, unless otherwise required by law, any other moneys) remaining in the Costs of Issuance Account shall be deposited into the Bond Fund hereinafter created to be used to pay the principal of and interest on the Bonds.

SECTION 30. Permitted Investments; Use of Investment Gain. Monies deposited in any fund or account created by this Resolution may be invested in any investments permitted under State law, as amended. Any gain from any investment and any reinvestment of any moneys accounted for in a fund pursuant to this Resolution, shall be deposited promptly upon the receipt of such gain at any time or from time to time into the Bond Fund, the Rebate Fund (hereafter created) or the Authority's general fund as directed by the Board or the Treasurer.

SECTION 31. Prevention of Bond Default. The Treasurer shall use any Bond proceeds credited to the Costs of Issuance Account, without further order or warrant, to pay the Bond Requirements of the Bonds as the same become due whenever and to the extent moneys otherwise

available therefor are insufficient for that purpose, unless such Bond proceeds shall be needed to defray obligations accrued and to accrue under any contracts then existing and relating to the Project. The Treasurer shall promptly notify the Board of any such use.

SECTION 32. Purchaser Not Responsible. The validity of the Bonds shall not be dependent on nor be affected by the validity or regularity of any proceedings relating to the Project, or any part thereof, or to the proper completion of the Project. The Purchaser of the Bonds, any associate thereof, and any subsequent registered owner of any Bond shall in no manner be responsible for the application or disposal by the Authority or by any of their officers, agents and employees of the proceeds derived from the sale of the Bonds or of any other moneys herein designated.

SECTION 33. Creation of SNWA Funds. There are hereby created or continued separate accounts to be held by the Treasurer of the Authority designated respectively as the:

- (1) "Southern Nevada Water Authority, Nevada, Water Revenue Refunding Bonds, Series 2013 Bond Fund" (the "Bond Fund");
- (2) "Southern Nevada Water Authority, Nevada, Operation and Maintenance Fund" (the "O & M Fund");
- (3) "Southern Nevada Water Authority, Nevada, Water Revenue Refunding Bonds, Series 2013 Rebate Fund (the "Rebate Fund"); and
- (4) "Southern Nevada Water Authority, Nevada, Water Revenue Fund" (the "Revenue Fund").

SECTION 34. Pledge of Revenues. Subject only to the right of the Authority to cause amounts to be withdrawn to pay the cost of the Project as provided herein, the Pledged Revenues and all moneys and securities paid or to be paid to or held or to be held in any fund or account under this Resolution, excluding, however, those funds held in the Rebate Fund, are hereby pledged to secure the payment of the Bond Requirements of the Bonds; and this pledge shall be valid and binding from and after the date of the first delivery of any Bonds, and the moneys, as received by the Authority and hereby pledged, shall immediately be subject to the lien of this pledge without any physical delivery thereof, any filing, or further act, and the lien of this pledge and the obligation to perform the contractual provisions hereby made shall have priority over any or all other obligations

and liabilities of the Authority, except for the Superior Lien Obligations; and the lien of this pledge shall be valid and binding as against all parties having claims of any kind in tort, contract or otherwise against the Authority (except as herein otherwise provided) irrespective of whether such parties have notice thereof. The lien of this pledge for the Bonds and any Parity Lien Obligations hereafter authorized shall be equally and ratably secured by the pledge of the Pledged Revenues hereunder, and the Bonds and any Parity Lien Obligations outstanding or hereafter issued are not entitled to any priority one over the other in the application of Pledged Revenues.

SECTION 35. Revenue Fund. All Pledged Revenues received by the Authority from the sale or distribution of water, connection charges or otherwise derived from the SNWS Water System, shall be paid into the Revenue Fund, and no disbursements shall be made from the Revenue Fund except as provided in this Resolution.

SECTION 36. Operation and Maintenance Fund. First, payments shall be made, as necessary, from the Revenue Fund to the O & M Fund. The necessary and reasonable costs of the operation and maintenance expenses of the SNWS Water System shall be paid from the revenues prior to the payment of principal and interest on the Superior Lien Obligations and the sums for other funds as provided in this Resolution. Moneys required for said operation and maintenance expenses shall from time to time be set aside from the Revenue Fund and transferred to the O & M Fund. The maintenance and operation expenses of the Authority shall be paid from the O & M Fund.

SECTION 37. Superior Lien Obligations. Second, payments shall be made, as required, from the Revenue Fund for the Superior Lien Obligations, including any reserves therefor, together with any amounts required to be paid to the United States in compliance with Section 148(f) of the Tax Code for the Superior Lien Obligations.

SECTION 38. Bond Fund. Third, and concurrently with the transfers to the bond funds created with respect to the outstanding Parity Lien Obligations and any Parity Lien Obligations hereafter issued, the following transfers shall be made to the Bond Fund:

A. Monthly, commencing on the fifteenth day of the month immediately succeeding the delivery of any of the Bonds, an amount in equal monthly installments necessary together with any other moneys from time to time available therefor from whatever source to pay the next maturing installment of interest on the Bonds, and monthly thereafter, commencing on each

interest payment date, one-sixth of the amount necessary, together with any other moneys from time to time available therefor from whatever source, to pay the next maturing installment of interest on the Bonds then outstanding; and

B. Monthly, commencing on the fifteenth day of the month immediately succeeding the delivery of any of the Bonds, an amount in equal monthly installments necessary, together with any other moneys from time to time available therefor from whatever source to pay the next maturing installment of principal of the Bonds then outstanding, and monthly thereafter, commencing on each principal payment date, one-twelfth of the amount necessary, together with any other moneys from time to time available therefor from whatever source, to pay the next maturing installment of principal of the Bonds then outstanding.

The moneys credited to the Bond Fund shall be used to pay the Bond Requirements of the Bonds as such Bond Requirements become due.

SECTION 39. Rebate Fund. Fourth, and concurrently with transfers to the rebate funds created with respect to any outstanding Parity Lien Obligations and any Parity Lien Obligations hereafter issued there shall be credited to the Rebate Fund and any rebate fund created for any Parity Lien Obligations, such amounts as are required to be deposited in each and to the Rebate Fund such amounts as are required to be deposited therein to meet the Authority's obligations under Covenant 10 contained in Section 46, hereof, in accordance with Section 148(f) of the Tax Code. Such deposits shall be made at such times as are required by Section 148(f) of the Tax Code and amounts in the Rebate Fund shall be used for the purpose of making the payments to the United States required by Section 148(f) of the Tax Code. Any amounts in the Rebate Fund in excess of those required to be on deposit therein may be withdrawn therefrom and deposited into the Revenue Fund.

SECTION 40. Termination of Deposits; Defraying Delinquencies.

(1) No payment need be made into the Bond Fund if the amounts in the Bond Fund equal a sum at least equal to the entire amount of the outstanding Bonds as to all Bond Requirements to their respective maturities both accrued and not accrued, in which case moneys in such fund in an amount, except for any interest or other gain to accrue from any investment of moneys in Federal Securities from the time of any such investment to the time or respective times the

proceeds of any such investment or deposit shall be needed for such payment, at least equal to such Bond Requirements, shall be used, together with any such gain from such investments, solely to pay such Bond Requirements as the same become due.

(2) If at any time the Authority shall for any reason fail to pay into the Bond Fund or the Rebate Fund the full amount above stipulated from the Pledged Revenues, then an amount shall be paid first into the Bond Fund and second into the Rebate Fund at such time equal to the difference between that paid from the Pledged Revenues and the full amount so stipulated, from the first Pledged Revenues available therefor. If securities (other than the Bonds) are outstanding, the payment of which are secured by a lien on the Pledged Revenues which lien is on a parity with the lien hereon of the Bonds, and if the proceedings authorizing issuance of those securities require the replacement of moneys in a bond fund, reserve fund or rebate fund therefor, then the moneys replaced in such bond fund, reserve fund or rebate fund shall be replaced on a pro rata basis related to the principal amount of the then outstanding Bonds and the then outstanding other Parity Lien Obligations securities, as moneys become available therefor, first into all of such bond and reserve funds and second into all such rebate funds.

SECTION 41. Use of Remaining Revenues. After the payments hereinabove required to be made, any remaining Pledged Revenues in the Revenue Fund may be used for the payment of any other securities payable from the Pledged Revenues, for any one or any combination of lawful purposes relating to the SNWS Water System, or otherwise, as the Authority may from time to time determine, including, without limitation, the payment of any bond requirements of any bonds or other securities relating to the SNWS Water System, including, any subordinate lien obligations.

SECTION 42. Lien of the Bonds. The Bonds constitute an irrevocable lien (but not necessarily an exclusive lien) upon the Pledged Revenues, subject to the liens of the Superior Lien Obligations, and on a parity with the lien of the Parity Lien Obligations and any Parity Lien Obligations hereafter issued.

SECTION 43. Issuance of Superior Lien Obligations or Parity Lien Obligations. Nothing herein prevents the issuance by the Authority of additional Superior Lien Obligations or Parity Lien Obligations nor prevents the issuance of bonds or other securities refunding all or a part

of any Superior Lien Obligations, Parity Lien Obligations or the Bonds. In connection with the authorization of any such additional securities the Board may on behalf of the Authority adopt any additional covenants or agreements with the holders of such additional securities as it deems appropriate.

SECTION 44. Subordinate Obligations Permitted. Nothing herein prevents the Authority from issuing additional bonds or other additional securities payable from the Pledged Revenues having a lien thereon subordinate, inferior and junior to the lien thereon of the Bonds.

SECTION 45. Issuance of Refunding Securities. At any time after the Bonds, or any part thereof, are issued and remain outstanding, if the Authority shall find it desirable to refund any outstanding Bonds or other outstanding Parity Lien Obligations or subordinate securities, such Bonds or other securities, or any part thereof, may be refunded.

SECTION 46. Protective Covenants. The Authority hereby particularly covenants and agrees with the registered owners of the Bonds and makes provisions which shall be a part of its contract with such registered owners to the effect and with the purposes set forth in the following provisions of this Section:

Covenant 1. Completion of Project. Simultaneously with the delivery of the Bonds, the Authority shall deposit Bond proceeds in the Acquisition Fund and the Bond Fund as provided in Section 29 herein, and proceed to complete the Project with all due diligence.

Covenant 2. Enforcement of SNWA Agreements. The Authority shall enforce the terms of the SNWA Agreements, and shall not consent to an amendment of those agreements which would reduce or delay the receipt of Pledged Revenues by the Authority.

Covenant 3. Operation of Water Facilities. The Authority shall at all times operate the SNWS Water System in a sound and economical manner and shall maintain, preserve and keep the same, with appurtenances and every part and parcel thereof, properly or cause the same to be so maintained, preserved and kept, in good repair, working order and condition, and will from time to time make, or cause to be made, all necessary and proper repairs, replacements and renewals so that at all times the operation of the SNWS Water System may be properly and advantageously conducted.

Covenant 4. Sale or Encumbrances. The works and properties of the Authority shall not be sold or leased or otherwise disposed of as a whole, or substantially as a whole, unless such sale, lease or other disposition be so arranged as to provide for a continuance of payments into the Bond Fund at least sufficient in amount to provide the sums required for such Bond Fund under the terms of this Resolution.

Covenant 5. Insurance. To the extent the Authority determines it is economically feasible to do so, the Authority shall at all times self-insure or maintain with responsible insurers all such insurance or other appropriate protection as is customarily maintained with respect to works and properties of like character against loss of or damage to such works or properties and against public or other liability to the extent reasonably necessary to protect the interest of the Authority and the registered owners of the Bonds. In determining the adequacy of its insurance, the Authority may take into account any federal programs that would be available to the Authority in the event of a loss. If any useful part of the works and properties of the Authority shall be damaged or destroyed, the Authority shall repair or replace the damaged works or properties so as to restore the same to use if necessary in order to produce revenues sufficient to comply with the Covenant 8, Rates and Charges, below. The proceeds of any insurance policies covering any such loss or damage shall be payable to the Authority, and shall be applied to the Authority's reasonable and necessary reconstruction costs and, to the extent not so applied, shall be paid into the Revenue Fund and used in the same manner as other moneys in said fund.

Covenant 6. Records and Accounts. The Authority will keep proper books of record and account, in accordance with sound accounting practice, in which complete and correct entries shall be made of its works and properties and the revenues received therefrom; which, together with all other books, papers and properties of the Authority shall at all times be subject to the reasonable inspection of the registered owner or owners of not less than ten percent (10%) in principal amount of the Bonds then outstanding or their representatives duly authorized in writing. The Authority will cause its books and accounts to be audited annually by an independent certified public accountant and will make available for inspection by the registered owners of such Bonds, at the office of the Authority Treasurer in Las Vegas, Nevada, a copy of the report of such accountant,

and will also upon payment of a reasonable charge furnish a copy thereof upon request to the registered owner of any Bond.

Covenant 7. No Free Service. No water or other service from the works or properties of the Authority may be furnished or rendered by the Authority to any city, town, county, public corporation or political subdivision of the State free, nor shall any such service be rendered at lower rates than those charged other persons for similar services; provided, however, that water may be furnished for fire protection purposes to such cities, towns, counties, public corporations or political subdivisions at lower rates, but no such rate or rates shall be less than the cost of the service, including reasonable overhead. Buildings or other property of the Authority shall not be furnished free or at any rate or charge less than the reasonable rental thereof, and shall not be sold at less than the reasonable value thereof, as determined by the Authority.

Covenant 8. Rates and Charges. The Board shall from time to time fix and collect from all users thereof, rates and charges for the connection, service, facilities and water of the Authority which will be sufficient, after making allowances for contingencies and error in the estimates, together with any funds of the Authority available to make the payments listed in A through C below which are not otherwise encumbered, to pay the following items of cost and expense in the following order:

- A. The operation and maintenance expenses of the SNWS Water System;
- B. All payments due on all Superior Lien Obligations of the Authority and any reserves therefor, as the same fall due, and the payments required to be made into any sinking fund for Superior Lien Obligations including any obligations hereafter issued on a parity with such Superior Lien Obligations; and
- C. The principal of and interest on all other Parity Lien Obligations of the Authority and any reserves therefor, as the same fall due, and the payments required to be made into any sinking fund for Parity Lien Obligations including the Bonds and any obligations hereafter issued on a parity with such Parity Lien Obligations.

In calculating the amount due on any obligation for the purposes of the foregoing covenant, the Authority may take into account the expected net payments (positive or negative) on any interest rate exchange agreement entered into as a hedge with respect to a particular obligation and any expected

refundings, including rollovers of commercial paper. In the case of obligations that bear interest at a variable interest rate, the Treasurer shall estimate the rate of interest on the obligations for purposes of this covenant.

Covenant 9. No General Fund or General Tax Priorities. The Authority will not issue any obligations having a priority over the Bonds for payment of principal and interest from General Taxes and the other sources specified in the second and third sentences of NRS 350A.152(1)(b).

Covenant 10. Tax Covenant. The Authority covenants for the benefit of the registered owners of the State Securities that it will not take any action or omit to take any action with respect to the State Securities, the proceeds thereof, any other funds of the Authority or any facilities refinanced with the proceeds of the State Securities if such action or omission (i) would cause the interest on the State Securities to lose its exclusion from gross income for federal income tax purposes under Section 103 of the Tax Code, or (ii) would cause interest on the State Securities to lose its exclusion from alternative minimum taxable income as defined in Section 55(b)(2) of the Tax Code except to the extent such interest is required to be included in the adjusted current earnings adjustment applicable to corporations under Section 56 of the Tax Code in calculating corporate alternative minimum taxable income. The foregoing covenant shall remain in full force and effect notwithstanding the payment in full or defeasance of the State Securities until the date on which all obligations of the Authority in fulfilling the above covenant under the Tax Code have been met.

SECTION 47. Defeasance. When all Bond Requirements of any Bond have been duly paid, the pledge, the lien and all obligations hereunder as to that Bond shall thereby be discharged and the Bond shall no longer be deemed to be outstanding within the meaning of this Resolution. There shall be deemed to be such due payment when the Authority has placed in escrow or in trust with a trust bank located within or without the State, an amount sufficient (including the known minimum yield available for such purpose from Federal Securities in which such amount may be initially invested wholly or in part) to meet all Bond Requirements of the Bond, as the same become due to the final maturity of the Bond, or upon any redemption date as of which the Authority shall have exercised or shall have obligated itself to exercise its prior redemption option. The Federal Securities shall become due before the respective times on which the proceeds thereof shall

be needed, in accordance with a schedule established and agreed upon between the Authority and the bank at the time of the creation of the escrow or trust, or the Federal Securities shall be subject to redemption at the option of the holders thereof to assure availability as needed to meet the schedule. For the purpose of this section "Federal Securities" shall include only Federal Securities which are not callable for redemption prior to their maturities except at the option of the owner thereof. When such defeasance is accomplished the Paying Agent shall mail written notice of the defeasance to the registered owners of the Bond at the addresses last shown on the registration records for the Bond maintained by the Registrar.

SECTION 48. Remedies for Enforcement. In addition to all other remedies provided by law or in equity, any registered owner of a Bond of the Authority, including a trustee for such registered owners, shall have the right, subject to any contractual limitation binding upon such registered owners or trustee, and subject to the prior or superior rights of others:

A. By mandamus or other suit, action or proceedings, at law or in equity, to enforce his or her right against the Authority and the Board, including the right to require the Authority and the Board to fix and collect rates and charges adequate to carry out any agreement as to, or pledge of, the revenues produced by such rates or charges, and to require the Authority and the Board to carry out any other covenants and agreements with the registered owners of the Bonds and to perform its and their duties pursuant to law.

B. By action or suit in equity to enjoin any acts or things which may be unlawful or a violation of the rights of the registered owners of the Bonds.

C. By action or suit in equity to require the Authority to act as if it were the trustee of an express trust for the registered owners of the Bonds.

D. By suit, action or proceeding in court exercising equitable jurisdiction to obtain the appointment of a receiver of the enterprise in which the Authority is engaged or any part or parts thereof, who may enter and take possession of such utility or any part or parts thereof, including all property, land, property rights, easements and other adjuncts of the utility, and such receiver may operate and maintain the same, and collect and receive all revenues thereafter arising therefrom in the same manner as the Authority itself might do, and shall deposit all such moneys in a

separate account or accounts and apply the same in accordance with the obligations of the Authority as the court shall direct,

provided, however, no registered owner of a Bond of the Authority, including a trustee for such registered owners, shall have the right to accelerate the principal of or interest on a Bond before its due date.

SECTION 49. Consents of Bondholders. No consent or notice to the registered owners of the Bonds is required for an amendment which cures any ambiguity, formal defect or omission herein, or which is not materially adverse to the Bondholders' interests, both as determined by the Authority, which determination is conclusive absent fraud or gross abuse of discretion. The consents of the registered owners of the Bonds provided for in the remainder of this section and Sections 50 to 57 inclusive hereof shall relate solely to the amendment, waiver or modification of covenants and provisions specified herein except as provided in Section 56 hereof and in the first sentence of this section. Any act relating to the amendment, waiver or modification of any of the said covenants or provisions consented to by the registered owners of the Bonds owning at least fifty-one percent (51%) in aggregate principal amount of outstanding Bonds, exclusive of Bonds, if any, owned by the Authority, shall be binding upon the registered owners of all of the Bonds and shall not be deemed an infringement of any of the provisions of this Resolution, whatever the character of such act may be, and may be done and performed as fully and freely as if expressly permitted by the terms of this Resolution, and after such consent relating to such specified matters has been given, no registered owner shall have any right or interest to object to such action or in any manner to question the propriety thereof or to enjoin or restrain the Board or any officer of the Authority from taking any action pursuant thereto.

SECTION 50. Calling Bondholders' Meeting. If the Board shall desire to obtain any such consent it shall duly adopt a resolution calling a meeting of the registered owners of the Bonds for the purpose of considering the action, the consent to which is desired.

SECTION 51. Notice of Meeting. Notice specifying the purpose, place, date and hour of such meeting shall be mailed by registered mail to each registered owner of the Bonds, such mailing to be not less than 60 days and not more than 90 days prior to the date fixed for the meeting. Such notice shall set forth the nature of the proposed action, consent to which is desired. The place,

date and hour of holding such meeting and the date of mailing such notice shall be determined by the Board, in its discretion. The actual receipt by any registered owner of notice of any such meeting shall not be a condition precedent to the holding of such meeting and failure to receive such notice shall not affect the validity of the proceedings thereat. A certificate by the Secretary, approved by resolution of the Board, that the meeting has been called and that notice thereof has been given as herein provided shall be conclusive as against all parties and it shall not be open to any registered owner to show that he or she failed to receive notice of such meeting.

SECTION 52. Voting Qualifications. The person in whose name a Bond is registered shall be conclusively deemed the owner thereof for the purpose of voting.

SECTION 53. Issuer-Owned Bonds. The Board covenants that it will present at the meeting a certificate, signed and verified by the Registrar and by the Treasurer, stating the maturities of all Bonds owned by, or held for account of, the Authority, directly or indirectly. No person shall be permitted at the meeting to vote or consent with respect to any Bond appearing upon such a certificate, or any Bond which it shall be established at or prior to the meeting is owned by the Authority, directly or indirectly, and no such Bond (in this Resolution referred to as a "issuer-owned Bond") shall be counted in determining whether a quorum is present at the meeting.

SECTION 54. Quorum and Procedure. A representation of at least fifty-one percent (51%) in aggregate principal amount of the Bonds then outstanding (exclusive of issuer-owned Bonds) shall be necessary to constitute a quorum at any meeting of the registered owners, but less than a quorum may adjourn the meeting, from time to time, and the meeting may be held as so adjourned without further notice, whether such adjournment shall have been had by a quorum or by less than a quorum. The Board shall, by an instrument in writing, appoint a temporary chairman of the meeting, and the meeting shall be organized by the election of a permanent chairman and a secretary. At any meeting each registered owner shall be entitled to one vote for every \$5,000 principal amount of Bonds with respect to which he or she shall be entitled to vote as aforesaid, and such vote may be given in person or by proxy duly appointed by an instrument in writing presented at the meeting. The Board, by its duly authorized representative, may attend any meeting of the registered owners, but shall not be required to do so.

SECTION 55. Vote Required. At any such meeting held as aforesaid there shall be submitted for the consideration and action of the registered owners a statement of proposed action, consent to which is desired, and if such action shall be consented and approved by registered owners holding at least fifty-one percent (51%) in aggregate amount of the Bonds then outstanding (exclusive of issuer-owned Bonds) the chairman and the secretary of the meeting shall so certify in writing to the Board, and such certificate shall constitute complete evidence of consent of the registered owners under the provisions of this Resolution. A certificate signed and verified by the chairman and the secretary of any such meeting shall be conclusive evidence and the only competent evidence of matters stated in such certificate relating to proceedings taken at such meeting.

SECTION 56. Amendments Prohibited. No such resolution shall permit without the consent of the registered owners of all Bonds adversely affected thereby:

A. A change in the maturity or in the terms of redemption of the principal or any installment thereof of any outstanding Bond or any installment of interest thereon; or

B. A reduction in the principal amount of any Bond, redemption premium, if any, or the rate of interest thereon; or

C. A reduction of the principal amount or percentages or otherwise affecting the description of Bonds the consent of the registered owners of which is required for any modification or amendment; or

D. The establishment of priorities as between Bonds issued and outstanding under the provisions of this Resolution; or

E. The modification of or otherwise materially and prejudicially affecting the rights or privileges of the registered owners of less than all of the Bonds then outstanding.

SECTION 57. Consent of All Owners. Notwithstanding anything contained in the foregoing provisions hereof, the terms and the provisions of this Resolution or of any instrument amendatory hereof or supplemental hereto and the rights and the obligations of the Authority and of the registered owners of the Bonds hereunder may be modified or amended in any respect upon the adoption by the Authority and upon the filing with the Secretary of an instrument to that effect and with the consent of the registered owners of all the then outstanding Bonds.

SECTION 58. Replacement of Registrar or Paying Agent. If the Registrar or Paying Agent initially appointed hereunder shall resign, or if the Board shall reasonably determine that the Registrar or Paying Agent has become incapable of performing its duties hereunder, the Board may, upon notice mailed to each registered owner of the Bonds at his or her address last shown on the registration records, appoint a successor Registrar or Paying Agent, or both. No resignation or dismissal of the Registrar or Paying Agent may take effect until a successor is appointed. It shall not be required that the same person or institution serve as both Registrar and Paying Agent hereunder, but the Authority shall have the right to have the same person or institution serve as both Registrar and Paying Agent.

Any corporation or association into which the Registrar or Paying Agent may be converted or merged, or with which they may be consolidated, or to which they may sell or transfer their corporate trust business and assets as a whole or substantially as a whole, or any corporation or association resulting from any such conversion, sale, merger, consolidation or transfer, to which they are a party, shall be and become the successor Registrar or Paying Agent under this Resolution, without the execution or filing of any instrument or any further act, deed, or conveyance on the part of any of the parties hereto, anything in this ordinance to the contrary notwithstanding.

SECTION 59. Delegated Powers. The officers of the Authority are hereby authorized and directed to take all action necessary or appropriate to effectuate the provisions of this Resolution, including, without limitation:

- A. The printing of the Bonds;
- B. The execution of such certificates as may be reasonably required by the Purchaser, relating, inter alia,
 - (1) the signing of the Bonds,
 - (2) the tenure and identity the officials of the Authority,
 - (3) the exemption of interest on the Bonds from federal income taxation,
 - (4) the delivery of the Bonds and the receipt of the Bond purchase price, and

(5) if it is in accordance with fact, the absence of litigation, pending or threatened, affecting the validity of the Bonds;

C. The completion and execution of the Certificate of the Treasurer;

D. The assembly and dissemination of financial and other information concerning the Authority and the Bonds.

SECTION 60. Resolution Irrepealable. After any of the Bonds are issued, this Resolution shall constitute an irrevocable contract between the Authority and the registered owners of the Bonds and shall be and shall remain irrepealable until the Bonds, as to all Bond Requirements, shall be fully paid, canceled and discharged, as herein provided.

SECTION 61. Repealer. All resolutions, bylaws and orders, or parts thereof, inconsistent herewith are hereby repealed to the extent only of such inconsistency. This repealer shall not be construed to revive any resolution, bylaw or order, or part hereof, heretofore repealed.

SECTION 62. Severability. If any section, paragraph, clause or provision of this Resolution shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such section, paragraph, clause or provision shall not affect any of the remaining provisions of this Resolution.

SECTION 63. Effective Date. This Resolution shall be effective upon its adoption by the Board, and after approval of the issuance of the Bonds by the Commission.

Proposed on November 15, 2012.

Proposed by Director _____.

Passed on November 15, 2012.

Ayes:

Sam Bateman
Shari Buck
Bob Coffin
Tom Collins
Duncan McCoy
Mary Beth Scow
Steve Sisolak

Nays:

Abstentions:

Absent:

INTRODUCED, ADOPTED AND APPROVED with the approval of each board member appointed by an SNWS purveyor or member (as defined in the SNWS Operating Agreement) on this November 15, 2012.

[AUTHORITY SEAL]

Attest:

Secretary,
Southern Nevada Water Authority

Chairman,
Southern Nevada Water Authority

STATE OF NEVADA)
)
 COUNTY OF CLARK) ss.
)
 SOUTHERN NEVADA)
 WATER AUTHORITY)

I, Patricia Mulroy, the duly chosen and qualified Secretary of the Southern Nevada Water Authority (the "Authority"), do hereby certify:

1. The foregoing pages constitute a true, correct, complete and compared copy of a resolution designated in Section 1 thereof by the short title "2013 Revenue Refunding Bond Resolution" adopted by the Board of Directors of the Authority (the "Board") on November 15, 2012.

2. The original of the resolution has been approved and authenticated by the signatures of the Chairman of the Authority and the Board and myself as Secretary of the Authority and the Board, and sealed with the seal of the Authority, and has been recorded in the minute book of the Board kept for that purpose in my office which record has been duly signed by such officers and properly sealed.

3. All of the members of the Board present at the meeting voted on the passage of the resolution as follows:

Those Voting Aye:

Sam Bateman
 Shari Buck
 Bob Coffin
 Tom Collins
 Duncan McCoy
 Mary Beth Scow
 Steve Sisolak

Those Voting Nay:

Those Abstaining:

Those Absent:

4. All members of the Board were given due and proper notice of the meeting.

5. Pursuant to Section 241.020, Nevada Revised Statutes, written notice of the meeting was given by 9:00 a.m. at least three working days before the meeting, including in the notice the time, place, location and agenda of the meeting:

(a) By giving a copy of the notice to each member of the Board;

(b) By posting a copy of the notice on the Authority's website, if any; at the principal office of the Board, or if there is no principal office, at the building in which the meeting is to be held; and at least three other separate, prominent places within the jurisdiction of the Board, to wit:

(i) Las Vegas Valley Water District
1001 South Valley View
Las Vegas, Nevada 89153;

(ii) Clark County Government Center
500 South Grand Central Parkway
Las Vegas, Nevada 89106;

(iii) City Hall, City of Henderson
240 Water Street
Henderson, Nevada 89104

(iv) City Hall, City of Las Vegas
495 S. Main Street
Las Vegas, Nevada 89101

and

(c) By giving a copy of the notice to each person, if any, who has requested notice of the meetings of the Board in accordance with the requirements of Chapter 241 of NRS

6. A copy of the notice so given of the meeting of the Board is attached hereto as Exhibit A.

7. Upon request, the governing body provides, at no charge, at least one copy of the agenda for its public meetings, any proposed ordinance or regulation which will be discussed at

the public meeting, and any other supporting materials provided to the members of the governing body for an item on the agenda, except for certain confidential materials and materials pertaining to closed meetings, as provided by law.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Southern Nevada Water Authority in Clark County, Nevada, this November 15, 2012.

Secretary, Southern Nevada Water Authority

(AUTHORITY SEAL)

EXHIBIT A

(Attach Copy of Notice of Meeting)

SOUTHERN NEVADA WATER AUTHORITY
BOARD OF DIRECTORS
AGENDA ITEM
November 15, 2012

Subject: Update on Water Resources	Director's Backup
Petitioner: Patricia Mulroy, General Manager	
Recommendations: That the Board of Directors receive an update from staff on water resources including, but not limited to, drought conditions in the Colorado River Basin, the results of the implementation of the Authority's Water Resource and Conservation Plans, activities on the Colorado River, the development of in-state water resources, and the status of the third intake project.	

Fiscal Impact:

None by approval of the above recommendation.

Background:

The Colorado River Basin has been experiencing a severe drought that began in 2000. The severity of these conditions has become increasingly evident in lake levels along the lower Colorado River Basin, where major reservoirs such as Lake Powell and Lake Mead are experiencing some of the lowest water levels in recent memory.

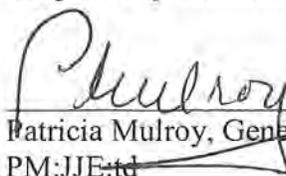
The nature of the drought in the Colorado River Basin has direct effects on water resources and future planning. The drought has prompted communities to launch major conservation initiatives to reduce water use among citizens and businesses, and has resulted in the development and implementation of the Authority's Water Resource and Conservation Plans.

In May 2005, the Board of Directors approved a project for design and construction of a third intake in Lake Mead with the primary objective of protecting southern Nevada's water supply from significant loss of system capacity resulting from a continuing decline in lake elevation. The project design and environmental approvals were completed by 2007. Construction began on the project in March of 2008.

This agenda item provides for an update from staff on the drought, the results of the implementation of the Authority's Water Resource and Conservation Plans, activities on the Colorado River, the development of in-state water resources, and the status of the third intake project.

The office of the General Counsel has reviewed and approved this agenda item.

Respectfully submitted:


Patricia Mulroy, General Manager
PM:JJE:td

AGENDA ITEM #	9
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