

Optimum Basin Management Program

Staff Status Report 2011-1: January to June 2011



CHINO BASIN WATERMASTER

Optimum Basin Management Program

Highlighted Activities

- California is experiencing the second wettest year on record and the State's surface reservoir are full allowing the Governor to officially proclaim an end to California's drought.
- As a result in the State's bountiful water supply, Metropolitan Water District of Southern California (MWD) made imported water available at the replenishment rate. Watermaster is purchasing 40,000-50,000 acre-feet of this water to be used toward future replenishment obligations. As of June 30, 2011, approximately 9,465 acre-feet of that water had been recharged. It will continue to be recharged through December 31, 2011.
- During the fiscal year, approximately 16,848 acre-feet of stormwater were recharged, the second-highest year on record. In addition, approximately 8,010 acre-feet of recycled water were recharged during the fiscal year.
- Watermaster is preparing a restated Judgment at the request of the Court. A draft version of the restated Judgment is available for review on the website.
- The proposed Chino Creek Well Field locations for Wells I-19, I-20, and I-21 by the Chino Desalter Authority (CDA) are under review by Watermaster. When completed and in operation, these wells will achieve hydraulic control and will not conflict with the Optimum Basin Management Plan (OBMP) goal to minimize or abate permanent subsidence.
- On June 14, 2011 the MWD Board approved the local resources program (LRP) grant for the desalters.
- Watermaster and the Inland Empire Utilities Agency (IEUA) are working together for the creation of a 5th retention facility at the Turner Basin. Up to 175,000 cubic yards of dirt are anticipated to be removed for the Milliken Avenue Grade Separation Project funded by the City of Ontario and the San Bernardino Associated Governments (SANBAG). This represents a savings of approximately \$4.5 million.



MWD Turnout CB-14

Program Element 1: Develop and Implement a Comprehensive Monitoring Program

Groundwater Level Monitoring

Watermaster initiated a comprehensive monitoring program as part of the implementation of the OBMP. The current groundwater level monitoring program is comprised of about 700 wells. At about 500 of these wells, water levels are measured by well owners, which include municipal water agencies, the California Department of Toxic Substance Control (DTSC), the County of San Bernardino, and various private consulting firms. The measurement frequency is typically about once per month. Watermaster collects these water level data quarterly. The remaining 200 wells are private wells or dedicated monitoring wells that are mainly located in the southern portion of the Chino Basin. Watermaster staff measures water levels at these wells using manual methods once per month or with

Important Court Hearings and Orders

- JANUARY 21—CHINO BASIN WATERMASTER COURT HEARING: REGARDING MOTION TO RE-APPOINT NINE MEMBER BOARD FOR A FURTHER FIVE-YEAR TERM
- JANUARY 26—ORDER GRANTING MOTION TO RE-APPOINT NINE MEMBER WATERMASTER BOARD FOR A FURTHER FIVE-YEAR TERM
- FEBRUARY 3—COURT OF APPEAL ORDER REGARDING PARAGRAPH 31 APPEAL BRIEFING SCHEDULE

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

GOVERNOR
JERRY BROWN
PROCLAIMED AN
END TO
CALIFORNIA'S
DROUGHT ON
MARCH 30,
2011.

pressure transducers that record water levels once every 15 minutes. The wells in the monitoring program within the southern portion of the Basin were preferentially selected to assist in Watermaster's monitoring programs for hydraulic control, land subsidence, and desalter impacts to private well owners. The remaining wells are monitored in support of the triennial recomputation of ambient water quality in the Chino-North management zone. The water level data are checked by Watermaster staff and uploaded to a centralized relational database.

Groundwater Quality Monitoring

Watermaster initiated a comprehensive monitoring program as part of the implementation of the OBMP. The groundwater quality monitoring program consists of the following four components:

1. An Annual Key Well Water Quality Monitoring Program consisting of 120 wells which are mostly privately owned agricultural wells in the southern portion of Chino Basin that are otherwise not included in an established sampling program. Twenty of these wells are sampled every year; the remaining wells are sampled every three years. The wells sampled annually are for the continuous monitoring of areas of concern associated with the southern edge of the Archibald South (formerly OIA) VOC plume, the southern region of the Chino Airport Plume, and the Kaiser Steel Plume which includes the two multi-port MZ-3 monitoring wells. Data obtained for the Key Well Quality Monitoring Program are used for the triennial ambient water quality analysis, hydraulic control assessment, the Biennial State of the Basin Report, and to assess the overall health of the Basin.
2. Annual sampling at nine HCMP multi-port monitoring wells strategically placed between the Chino Basin Desalter well fields and the Santa Ana River. Results of the annual sampling are used to analyze the effect of desalter pumping over time by comparing water quality of the native groundwater and the Santa Ana River.
3. Monthly sampling at four near-river wells to characterize the Santa Ana River's influence to nearby groundwater. These shallow monitoring wells along the Santa Ana River consist of two former United States Geologic Survey (USGS) National Water Quality Assessment Program (NAWQA) wells (Archibald 1 and Archibald 2), and two wells (Well 9 and Well 11) owned by the Santa Ana River Water Company (SARWC).
4. A cooperative basin-wide data collection effort known as the Chino Basin Data Collection (CBDC) program which relies on municipal producers and other government agencies to supply groundwater quality data on a cooperative basis. These sources include the

Appropriators, Department of Toxic Substance Control (DTSC), Regional Water Quality Control Board (RWQCB), US Geological Survey (USGS), the Counties, and other cooperators. All water quality data are routinely collected, QA/QC'd, and loaded into Watermaster's relational database.

Groundwater-Production Monitoring

All active wells (except for minimum user wells) are now metered. Watermaster reads the agricultural production data from the meters on a quarterly basis and enters these data into Watermaster's relational database.

Surface Water Monitoring

Water Quality and Quantity in Recharge Basins. Watermaster measures the quantity of storm and supplemental water entering the recharge basins. Pressure transducers or staff gauges are used to measure water levels during recharge operations. In addition to these quantity measurements, imported



Watermaster operations staff preparing to pump a monitoring well to collect water quality samples

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

water quality data for State Water Project water are obtained from the Metropolitan Water District of Southern California (MWDSC) and recycled water quality data for the RP-1 and RP-4 treatment plant effluents are obtained from IEUA. Combining the measured flow data with the respective water qualities enables the calculation of the blended water quality in each recharge basin, the "new yield" to the Chino Basin, and the adequate dilution of recycled water.

Surface Water Monitoring in the Santa Ana River (SAR). Watermaster measures the discharge of the River and selected water quality parameters to determine those reaches of the SAR that are gaining flow from the Chino Basin and/or, conversely, those reaches that are losing flow into the Chino Basin. These bi-weekly flow and water quality measurements are combined with discharge data from permanent USGS stream gauges and discharge data from publicly owned treatment works (POTWs). These data are used along with groundwater modeling to assess the extent of hydraulic control.

HCMP Annual Report

In January 2004, the RWQCB amended the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin to incorporate an updated total dissolved solids (TDS) and nitrogen (N) management plan. The Basin Plan Amendment includes both "antidegradation" and "maximum benefit" objectives for TDS and nitrate-nitrogen for the Chino and Cucamonga groundwater management zones. The application of the "maximum benefit" objectives relies on Watermaster and IEUA's implementation of a specific program of projects and requirements, which are an integral part of the OBMP. On April 15, 2005, the RWQCB adopted resolution R8-2005-0064; thus approving the Surface Water Monitoring Program and Groundwater Monitoring Program in support of maximum benefit commitments in the Chino and Cucamonga Basins.

Pursuant to the Basin Plan and the Watermaster/IEUA permit to recharge recycled water, Watermaster and IEUA have conducted groundwater and surface water monitoring programs since 2004. During this reporting period, Watermaster measured 426 manual water levels at private wells throughout the Chino Basin, conducted two quarterly downloads at the 130 wells containing pressure transducers, collected 26 groundwater quality samples, 221 surface water quality samples, and 36 direct discharge stream measurements. Quarterly Surface Water Monitoring Program Reports that summarize data collection efforts were submitted to the RWQCB in January and April of 2011. The Chino Basin Maximum Benefit Monitoring Program 2010 Annual Report was submitted to the RWQCB on April 15, 2011.



Installing a pressure transducer

Chino Basin Groundwater Recharge Program

IEUA, Watermaster, CBWCD, and the SBCFCD jointly sponsor the Chino Basin Groundwater Recharge Program. This is a comprehensive water supply program to enhance water supply reliability and improve the groundwater quality in local drinking water wells throughout the Chino Basin by increasing the recharge of storm water, imported water, and recycled water. The recharge program is regulated under RWQCB Order No. R8-2007-0039 and Monitoring and Reporting Program No. R8-2007-0039.

Recharge Activities. On-going recycled water recharge occurred in the Brooks, 7th Street, 8th Street, Victoria, San Sevaine, Ely, Hickory, and RP-3 Basins this reporting period.

Monitoring Activities. Watermaster and IEUA collect weekly water quality samples from basins that are actively recharging recycled water and from lysimeters installed within those

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

basins. During this reporting period, approximately 475 basin and lysimeter samples were collected and 21 recycled water samples were collected for alternative monitoring plans that include the application of a correction factor for Soil-Aquifer Treatment determined from each basin's start-up period. Monitoring wells located down-gradient of the recharge basins were sampled quarterly at a minimum, however, some monitoring wells were sampled more frequently during the reporting period for a total of 85 samples.

Reporting. Watermaster and IEUA completed the following required reports concerning the recharge program during the reporting period:

- 4Q-2010 Quarterly Report, submitted to the RWQCB – February 2011
- 1Q-2011 Quarterly Report, submitted to the RWQCB – May 2011
- 2010 Annual Report, submitted to the RWQCB — May 2011

Land Surface Monitoring

The MZ-1 Subsidence Management Plan (MZ-1 Plan) was approved by Watermaster in October 2007, and was approved by the Court in November 2007 which ordered its implementation (see Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1). The MZ-1 Plan calls for a number of activities with the goal of minimizing or completely abating the future occurrence of land subsidence and ground fissuring in Chino Basin. Some of these activities include:

- Continuing the scope and frequency of monitoring within the so-called Managed Area (southwest MZ-1) that was conducted during the period when the MZ-1 Plan was being developed.
- Expanding the monitoring of the aquifer system and land subsidence into other areas of MZ-1 and Chino Basin where the data indicate concern for future subsidence and ground fissuring.
- Monitoring of horizontal strain across the historical fissure zone.
- Further evaluating the potential contribution of pumping in the central and northern portions of MZ-1 on groundwater conditions in the central and southern portions of MZ-1.
- Conducting additional testing and monitoring to refine the Guidance Criteria.
- Developing alternative pumping plans for the MZ-1 producers that are impacted by the MZ-1 Plan.



MZ-1 Monument Construction & Surveying

- Constructing and testing a lower-cost extensometer facility at Ayala Park.
- Evaluating and comparing ground-level surveying and Interferometric Synthetic Aperture Radar (InSAR), and recommending future monitoring protocols for both techniques.
- Conducting an ASR (aquifer injection and recovery) feasibility study at a production well owned by the City of Chino Hills within the Managed Area.
- Providing for recovery of groundwater levels.

It was determined that the land subsidence is not just isolated to MZ-1. Hence, the Board of Directors approved the formation of the Land Subsidence Committee in December 2010, and its first meeting was held on January 20, 2011.

Optimum Basin Management Program

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

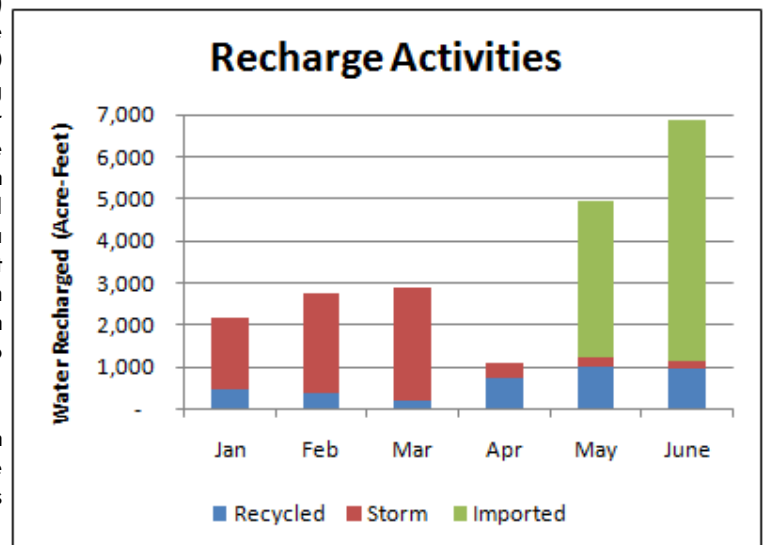
With regard to monitoring and testing, Watermaster began or continued the implementation of some of these activities called for in the MZ-1 Plan. During this reporting period these activities included:

- The continuation of detailed water-level monitoring at wells within the Managed Area and at wells in central MZ-1.
- Continuation of monitoring and maintenance at the Ayala Park Extensometer Facility. This includes monitoring at the newly installed lower-cost pair of cable extensometers within two piezometers at Ayala Park to test this technology for application in other parts of the Basin.
- Collected InSAR data from radar satellites during all six months of the reporting period, which will be analyzed for land surface displacement in early 2012.
- Performed the Spring 2011 ground-level survey across the MZ-1 Managed Area.
- Continued to plan for and implement a new testing and monitoring program within the MZ-1 Managed Area with the goals of (1) refining the Guidance Criteria, (2) confirming the existence of the Riley Barrier, (3) testing the feasibility of injection in the Managed Area, and (4) evaluating the effect of pumping/drawdown and injection/recovery on the fissure zone.
- Prepared equipment to install a horizontal extensometer across the zone of historical ground fissuring. This work was performed by the subcontractor that will be installing and calibrating the horizontal extensometer and data loggers.
- Prepared a right-of-entry agreement with a private property owner in the City of Chino to install the horizontal extensometer.
- Developed a scope of work and budget for Watermaster's 2011-12 fiscal year. The main features of this scope include (1) the installation of the horizontal extensometer across the fissure zone, (2) the installation of a new vertical extensometer near the Chino Creek Well Field, and (3) the implementation of a testing and monitoring program in the MZ-1 Managed Area during 2012 and 2013.

Program Element 2: Develop and Implement a Comprehensive Recharge Program

The theoretical average stormwater recharge capacity of the Chino Basin Facilities Improvement Program (CBFIP) facilities is about 14,000 acre-feet/yr (AFY) and the theoretical supplemental water recharge capacity is 99,000 AFY. Stormwater recharge in the first half of year ending June 30, 2011 was about 7,468 acre-feet. Recycled water recharge during this period were about 3,768 acre-feet. The IEUA and Watermaster recharge permit was amended in fiscal year 2009-10 to allow for underflow dilution and extended the dilution period from a running 60 months to a running 120 months. The significance of this permit amendment was to reduce the amount of imported and storm waters required for dilution. IEUA projects that dilution requirements will likely be met through 2019-20, even if no imported water were available for dilution.

In May, the Metropolitan Water District of Southern California (MWD) made water available at the replenishment rate. It had been approximately four years



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Program Element 2: Develop and Implement a Comprehensive Recharge Program (Continued)

since it was last available. Watermaster intends to recharge 40,000-50,000 acre-feet of imported water to offset basin overdraft and to meet future replenishment obligations.

The cumulative unmet replenishment obligation (CURO) was approximately 8,889 acre-feet. It was fully satisfied in May 2011 by purchasing water from Appropriators. The total amount of supplemental water recharged in MZ-1 since the Peace II Agreement is approximately 19,671 acre-feet, which is 6,329 acre-feet (cumulative) less than the average annual requirement of 6,500 acre-feet.

As part of the Recharge Master Plan Implementation, MZ-3 recharge opportunities were discussed. The projects include Wineville Basin spillway and pipeline and pump station to Jurupa Basin, Jurupa Basin and RP-3 Inlet improvements. The Riverside County Flood Control and Water Conservation District is potentially looking to participate in the funding of these projects that would have a direct benefit to their service area.

Program Element 3: Develop and Implement Water Supply Plan for the Impaired Areas of the Basin; and Program Element 5: Develop and Implement Regional Supplemental Water Program

Construction of the Chino I Desalter Expansion and the Chino II Desalter facilities was completed in February 2006. As currently configured, the Chino I Desalter provides 2.6 million gallons per day (MGD) of treated (air stripping for VOC removal) water from Well Nos. 1-4, 4.9 MGD of treated (ion exchange for nitrate removal) water from Well Nos. 5-15, and 6.7 MGD of treated (reverse osmosis for nitrate and TDS removal) water from Well Nos. 5-15 for a total of 14.2 MGD (15,900 AFY). The Chino II Desalter provides 4.0 MGD of ion exchange treated water and 6.0 MGD of reverse osmosis treated water from eight additional wells for a total of 10.0 MGD (11,200 AFY).

Planning continued between the Chino Desalter Authority (CDA) and Western Municipal Water District (WMWD) to expand the Chino II Desalter by 10.5 MGD (11,800 AFY). Watermaster worked with the CDA parties to produce a realistic schedule approved by the RWQCB last June. Raw water will be drawn from existing CDA II wells, and possible additional new wells, if needed. In addition, a new Chino Creek Desalter Well Field, required for the hydraulic control commitment associated with Maximum Benefit, will provide additional raw water to the Chino I Desalter, enabling some existing wells to direct production to the expanded Chino II Desalter facility.

On June 14, 2011 the MWD Board approved the local resources program (LRP) grant for the desalters.

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1 and Management Zone 3

MZ-1 Management Plan

Because of the historical occurrence of pumping-induced land subsidence and ground fissuring in southwestern Chino Basin (southern MZ-1), the OBMP called for the development and implementation of an Interim Management Plan (IMP) for MZ-1 that would:

- Minimize subsidence and fissuring in the short-term,
- Collect information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring, and
- Formulate a management plan to reduce to tolerable levels or abate future subsidence and fissuring.

From 2001-2005, Watermaster developed, coordinated, and conducted an Interim Monitoring Program (IMP) under the guidance of the MZ-1 Technical Committee, which is composed of representatives from all major MZ-1 producers and their technical consultants. The IMP was an aquifer-system and land subsidence investigation focused in the southwestern region of MZ-1 that would support the development of a long-term management plan to minimize and abate subsidence and fissuring (MZ-1 Plan). The IMP involved the construction of highly-sophisticated monitoring facilities, such as deep borehole extensometers and piezometers, the monitoring of land surface displacements through traditional ground-level surveys and remote-sensing techniques, the detailed monitoring of

Optimum Basin Management Program

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1 and Management Zone 3 (Continued)

the aquifer system with water-level-recording transducers installed at an array of production and monitoring wells, and the purposeful stressing of the aquifer system through multiple controlled pumping tests.

The investigation methods, results, and conclusions are described in detail in the MZ-1 Summary Report, dated February 2006. The investigation provided enough information for Watermaster to develop Guidance Criteria for the MZ-1 producers in the investigation area that, if followed, would minimize the potential for subsidence and fissuring during the completion of the MZ-1 Plan. The Guidance Criteria included a listing of Managed Wells and their owners subject to the criteria, a map of the so-called Managed Area, and an initial threshold water level (Guidance Level) of 245 feet below the top of the PA-7 well casing. The MZ-1 Summary Report and the Guidance Criteria were adopted by the Watermaster Board in May 2006. The Guidance Criteria formed the basis for the MZ-1 Plan, which was approved by Watermaster in October 2007. The Court approved the MZ-1 Plan in November 2007 and ordered its implementation.

During this reporting period, Watermaster continued implementation of the MZ-1 Plan. Drawdown at the PA-7 piezometer did not fall below the Guidance Level during the reporting period, and very little, if any permanent compaction was recorded at the Ayala Park Extensometer. The ongoing monitoring program called for by the MZ-1 Plan continues to be implemented.

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region (Regional Board) and Other Agencies to Improve Basin Management; and Program Element 7: Develop and Implement a Salt Management Program

Ontario International Airport (Archibald South Plume)

Watermaster continued to negotiate with the potentially responsible parties (PRPs) associated with the Ontario International Airport (OIA). The PRPs have formed a group called ABGL (Aerojet, Boeing, GE, and Lockheed). Watermaster has continued to participate in meetings with ABGL and their consultants, counsel, the Regional Board, and CDA in order to find common ground for a joint remedy for desalting and plume mitigation. Watermaster prepared technical and legal responses to a presentation made by ABGL's technical consultant in December 2010. Watermaster also coordinated with ABGL's consultant regarding the next round of sampling for VOCs in ABGL's monitoring wells.

Chino Airport

Watermaster continued to negotiate with the County of San Bernardino, Department of Airports (County) in order to find common ground for a joint remedy for desalting and plume mitigation. Watermaster coordinated with the Chino Desalter Authority's consultant, who provided an update on the well drilling and construction activities at the Chino Creek Desalter Well Field (CCWF). Watermaster reviewed hydrogeological information for a cross-section near the Chino Desalter and CCWF (pumping test analysis, cross-sections, etc.) in order to develop estimates of Darcian groundwater flux past this area. Then Watermaster prepared maps and charts of the groundwater model that estimate the degree of hydraulic control that would be achieved after the CCWF is completed as well as the fate of the Chino Airport plume. Watermaster prepared for and attended a meeting at San Bernardino County offices with County staff and technical consultants in February 2011 to present the groundwater model results. Watermaster also prepared a letter report (text, tables, and figures) of modeling results of the Peace II alternative with updated well locations for the CCWF and pumping rates for all Chino Desalter wells.

Watermaster reviewed maps and aerial photos of Chino Creek to develop a surface water monitoring program to characterize groundwater/surface water interactions along Chino Creek.

California Institute for Men

Watermaster continued to coordinate with the State on a memorandum of understanding that would allow Watermaster to continue to monitor a subset of wells on CIM. Watermaster prepared the following letter: "Chino Basin Groundwater Monitoring Programs: Preservation of Certain Monitoring Wells Owned by the State of California at the California Institute for Men (CIM)."

Optimum Basin Management Program

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region (Regional Board) and Other Agencies to Improve Basin Management; and Program Element 7: Develop and Implement a Salt Management Program (Continued)

Other Water Quality Issues

Watermaster is responding to a public information request regarding perchlorate and perchlorate stable isotope testing in the Chino Basin. The request was made by Lewis, Brisbois, Bisgaard, & Smith LLP, who are defending Sociedad Química y Minera de Chile S.A. (SQM), a Chilean company that historically produced fertilizer that was imported to the United States.

Program Element 8: Develop and Implement a Groundwater Storage Management Program; and Program Element 9: Develop and Implement a Storage and Recovery Program

The existing Watermaster/IEUA/MWDSC Dry-Year Yield (DYY) program continued during the reporting period. All DYY program construction projects have been completed and are currently being used for DYY “take”, or removal from storage. As of April 30, 2011 all of the water in the DYY storage account was extracted, leaving the account with a zero balance.

In February 2008, the DYY Expansion Project was initiated by IEUA and Watermaster to evaluate increasing the DYY storage account. The purpose of the DYY Expansion Project was to determine the facilities needed to store up to 150,000 acre-feet and to recover up to 50,000 acre-feet/year. The expansion project analysis was completed in December 2008. The expansion project evaluated the technical, financial, and institutional frame work for individual projects to move forward. Negotiations to-date related to actual projects and the amount of expansion have not resulted in any planned expansion projects.

IN MAY, MWD
MADE WATER
AVAILABLE
AT THE
REPLENISHMENT
RATE FOR THE
FIRST TIME IN
APPROXIMATELY
FOUR YEARS.
WATERMASTER
INTENDS TO
RECHARGE
40,000-50,000
ACRE-FEET OF
IMPORTED
WATER TO BE
USED TOWARD
FUTURE
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OBLIGATIONS.