



United States Department of the Interior 149080

GEOLOGICAL SURVEY
 WATER RESOURCES DIVISION
 P. O. Box 3202
 Portland, Oregon 97208

September 7, 1979

Mr. Carl Goebel, Administrator
 City of Portland
 Department of Public Utilities
 Bureau of Water Works
 1800 S.W. 6th Avenue
 Portland, OR 97201

Attention: Robert F. Willis

Dear Carl:

We will need to firm up our tentative agreement to continue our cooperative water resources study involving the digital simulation of the Portland well field area in east Multnomah County, for the coming Federal fiscal year (October 1, 1979 to September 30, 1980). You will recall that during our meeting earlier this year, March 29, 1979, we agreed that, subject to the availability of funds from the city of Portland as well as the Geological Survey, we would continue this study in 1980 at the \$97,600 level to be shared equally by city of Portland and Geological Survey. I now have approval to firm up the USGS share. Accordingly, Geological Survey will make available \$48,800 to continue this study in fiscal year 1980. The city's share likewise will be \$48,800, of which \$38,100 will be in the form of cash and \$10,700 will be furnished in direct services.

I have prepared a joint funding agreement and included the above figures for your review and approval. Please execute all copies of the agreement and return them to me for further processing. I will send you a fully executed copy for your files.

Carl, if you have any questions regarding this program or wish to discuss it further please do not hesitate to contact me. We are looking forward to working with the Water Bureau on what we consider a high-priority study critical to the development of an adequate supplemental or alternate water supply for the city of Portland and environs. Thank you for your kind cooperation.

Sincerely yours,

Stan
 Stanley F. Kapustka
 District Chief

Encl.

ONE HUNDRED YEARS OF EARTH SCIENCE IN THE PUBLIC SERVICE

cc: R. Willis



Department of the Interior
Geological Survey
COOPERATIVE AGREEMENT
FOR

Agreement No. 2

14903

JOINT FUNDING

WATER RESOURCES INVESTIGATIONS

THIS AGREEMENT is entered into as of the 1st day of October 1979 by the GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the City of Portland, OR, DEPARTMENT OF PUBLIC UTILITIES, BUREAU OF WATER WORKS,

party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation

A digital simulation of the Portland Well-field area
in east Multnomah County, OR

hereinafter called the program.

2. The following amounts shall be contributed to cover all of the cost of the necessary field and office work directly related to this program, but excluding any general administrative or accounting work in the office of either party and excluding the cost of publication by either party of the results of the program.

(a) \$ 48,800 by the party of the first part during the period October 1, 1979
to September 30, 1980

(b) \$ 48,800 by the party of the second part during the period October 1, 1979
to September 30, 1980, of which \$10,700 will be in
the form of direct services.

(c) Additional amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.

3. Expenses incurred in the performance of this program may be paid by either party in conformity with the laws and regulations respectively governing each party, provided that so far as may be mutually agreeable all expenses shall be paid in the first instance by the party of the first part with appropriate reimbursement thereafter by the party of the second part. Each party shall furnish to the other party such statements or reports of expenditures as may be needed to satisfy fiscal requirements.

4. The field and office work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.

5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.

6. During the progress of the work all operations of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.

7. The original records resulting from this program shall be deposited ultimately in the office of the party of the first part and shall become part of the records of that office. Copies shall be furnished to the party of the second part upon request.

8. The maps, records or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at cost, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records or reports published by either party shall contain a statement of the cooperative relations between the parties.

CITY OF PORTLAND, OR, Bu. of Water Works

GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE INTERIOR

By Cal Stall

By _____

By _____

(SIGNATURE & TITLE)

By _____



United States Department of the Interior

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
P. O. Box 3202
Portland, Oregon 97208

149030

November 15, 1979

Mr. Carl Goebel, Administrator
City of Portland
Department of Public Utilities
Bureau of Water Works
1800 S.W. Sixth Avenue
Portland, OR 97201

Dear Carl:

This is in response to your request of September 26 for a list of planned accomplishments, during the current fiscal year and last year's (1979 FY) accomplishments in the Bull Run Watershed and the Digital Simulation of the Portland Well-Field Area. The scope of work for the Bull Run Watershed project during Federal fiscal year 1980 will remain as outlined in my letter to the Bureau of Water Works dated June 5, 1979 (copy attached). The budget for 1980 has been reduced reflecting the fact that all prior construction and installation of stations and equipment has been completed.

I will summarize our planned accomplishments for this year by making reference to specific sections of the letter mentioned above.

Data Collection: We will continue to operate automatic samplers and water quality monitors at the Bull Run, Fir Creek, North Fork, and South Fork stations and maintain stage-discharge relationships on Deer Creek, Cougar Creek, Bear Creek, Fivemile Creek, and Camp Creek. Again, physical, chemical, and bacteriological data collected by the city, as well as the sediment, temperature, and specific conductance records will be published for all nine sites in the U.S. Geological Survey's Annual Report Water Resources Data for Oregon.

Comparison between cross-section profiles of Bull Run Reservoir No. 1 and earlier maps of the reservoir will continue in an effort to identify areas of sediment deposition. If this analysis proves to be worthwhile, additional cross sections on reservoirs 1 and 2 will be made.

Low flow diel (24 hour) data will continue to be collected on selected tributaries to document low water conditions. During the summer of 1979, these data were collected at two Cougar Creek sites (No. 12 and 63) on July 24-25 and at South Fork Bull Run and Fir Creek on July 25-26.



ONE HUNDRED YEARS OF EARTH SCIENCE IN THE PUBLIC SERVICE

NOV 19 1979

The collection of attached algae using artificial substrates will continue to be coordinated with Bob Willis to assure that there are no conflicts with the scheduled treatment of tributaries within the watershed.

Quality Control: We will continue to maintain a quality control program between the USGS and Portland water quality laboratories as outlined in the attached letter.

Program Changes: We are not recommending any program changes at this time that were not already listed in the attached letter.

The data collection and analysis scheme outlined in the attached letter and summarized here is providing some of the information needed to define hydrologic characteristics and establish statistical relationships between water quality parameters and existing information on climate, physiography, and land use in the Bull Run Watershed. The findings will be presented in an interpretive report scheduled for release in Federal fiscal year 1983.

With respect to the Digital Simulation of the Portland Well-Field Area this summary reviews accomplishments during the past year and outlines the direction our ground-water modeling efforts will take this year.

After a preliminary modeling analysis which took into account factors such as system geometry and the availability and quality of hydraulic and hydrologic data, it was decided that the problem warranted the use of a three-dimensional (3-D) ground-water flow model. In its present condition this model covers nearly 70 square miles and has four layers which have been discretized into over 9000 grid blocks. The primary emphasis of our modeling work to date has been on calibrating the model using data from pumping tests performed on the pilot wells. In the central part of the well field, the model is now capable of reproducing, with a good degree of accuracy, the observed results of these pumping tests. The model has been used to simulate aquifer response to the simultaneous pumping of six proposed production wells for periods of 30, 60, and 90 days. The results of these simulations were made available to the Water Bureau for evaluation of the planned locations, depths, and discharges of these wells. The model was then used to predict the drawdown resulting from the pumping of the first of these six wells during pumping tests of 1, 2, and 3 days. This latter run will be used by the Bureau in selecting the locations of piezometers to be monitored, and the possible magnitude of drawdown to be expected during the actual pumping test.

At this time we believe that the model is at or near the level of calibration described by the project proposal for the end of "Part 1." More importantly, we believe it can and will be useful as a semi-quantitative predictive tool during the initial phase of well-field design and development.

Mr. Carl Goebel, City of Portland

-3-

Nov. 15, 1979

Our plans for FY 1980 are essentially those outlined as "Part 2" of the project proposal. The proposal calls for the expansion of the model grid to roughly 20,000 nodes. The new grid will, however, not only cover a greater area, but provide increased resolution over a larger area of interest. An essential step in the design of the enlarged grid will be an in-depth analysis of the local stratigraphy with respect to the thickness and areal extent of the primary aquifers and clay beds. This will allow a more accurate representation of boundary conditions in the expanded model.

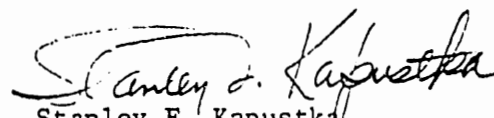
During the development of the larger grid, calibration of the original model will continue using additional pilot well pump test data. Also, tests will be made to determine the relative significance of water available from storage in clay beds as opposed to water which passes through these clay beds as leakage between aquifers.

Once the larger model is ready, the physical parameters derived from the smaller model will be integrated. Work will then begin on the calibration of a steady-state model (a model in which natural flow and head distributions are reproduced). Once the steady-state model has reached a satisfactory stage of calibration, or the calibration process has reached the point of diminishing returns, work on the transient model can begin, using newly available high-discharge pumping test data from the first of the six production wells being installed this fall. From that point forward, the steady-state and transient models will be run alternately, checking and rechecking the effects of parameter changes on each. This iterative calibration process will undoubtedly carry us into FY 1981.

During the coming year we also will be investigating the possible use of a linear programming (LP) management model. The ground-water flow model is a necessary prerequisite to the formulation of such a model; that is, once the flow model is capable of predicting the effects of a specified stress on the subsurface hydrologic system, its parameters are incorporated into the LP model as constraints. LP models have been shown to be of great utility in managing hydrologic systems due to their ability to identify the optimal locations and magnitudes of stress necessary to achieve specific management objectives. In terms of reducing capital expenditures and long-term operating costs, we believe the use of an LP management model may be of great benefit to the City.

Carl, if you need more information or wish to discuss these projects further please don't hesitate to contact me. We look forward to another year of cooperation with the Water Bureau in 1980 FY.

Sincerely yours,


Stanley F. Kapustka
District Chief

Encl.
cc: R.F. Willis

ORDINANCE NO. 149030

An Ordinance authorizing an extended agreement with the United States Geological Survey for the utilization of a mathematical simulation model in conjunction with the Groundwater Development Program for the Bureau of Water Works, for the amount of \$38,100.00, authorizing the drawing and delivery of warrants, and declaring an emergency.

The City of Portland ordains:

Section 1. The Council finds:

1. The Water Bureau entered into Agreement No. 17557 with the United States Geological Survey pursuant to Ordinance No. 146607, wherein the parties agreed to cooperate in the construction and operation of a computer model to assist in locating and predicting performance of wells in selected aquifers in conjunction with the Groundwater Development Program, which agreement expired September 30, 1979.
2. The United States Geological Survey has adapted a computer model for the Bureau of Water Works Groundwater Development Program requirements, and the Bureau of Water Works requires the continued utilization of the computer simulation model for the second year of a four-year study.
3. The Bureau of Water Works needs to extend the cooperative agreement with the United States Geological Survey for the utilization of the computer simulation model for a one-year period beginning October 1, 1979 to coincide with the U.S. Geological Survey fiscal year.
4. The Cooperative Agreement in the form of Exhibit "A", attached to original only, should be entered into for said Groundwater Development Program.
5. The City cost of the cooperative agreement is \$38,100, with the full amount presently appropriated within the Water Fund, BUC 18600374, Project No. 3700, Object Code 210, Professional Services.

NOW, THEREFORE, the Council directs:

- a. The Mayor and Commissioner of Public Utilities hereby are authorized to execute an extended agreement with the United States Geological Survey, substantially in accordance with the form of the Agreement attached to original only, marked Exhibit "A".

ORDINANCE No.

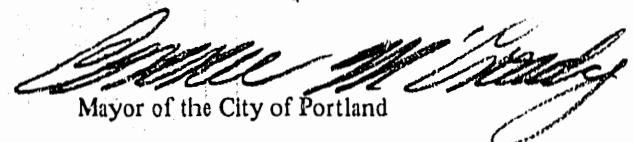
- b. The Mayor and Auditor are authorized to draw and deliver warrants chargeable to the 1979-80 Budget, Water Fund, Bureau of Water Works BUC 18600374, Project 3700, Object Code 210, Professional Services, when demand is presented, approved by the proper authorities.

Section 2. The Council declares that an emergency exists because a delay in proceeding with the agreement and contract may result in additional expense, and will unnecessarily impede the Groundwater Development Program; therefore, this Ordinance shall be in force and effect from and after its passage by the Council.

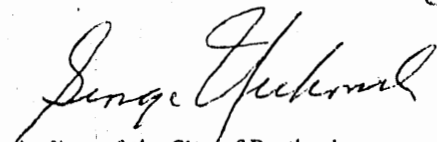
ORDINANCE NO. 149030

Passed by the Council, JAN 16 1980

Commissioner Ivancie
 January 8, 1980
 M.Lucas:jb
 BUC 18600374
 Project 3700
 Obj. Code 210


 Mayor of the City of Portland

Attest:


 Auditor of the City of Portland

Calendar No. 146

ORDINANCE No. 149030

Title

An Ordinance authorizing an extended agreement with the United States Geological Survey for the utilization of a mathematical simulation model in conjunction with the Groundwater Development Program for the Bureau of Water Works, for the amount of \$38,100, authorizing the drawing and delivery of warrants, and declaring an emergency.

THE COMMISSIONERS VOTED AS FOLLOWS:		
	Yeas	Nays
Ivancie	/	
Jordan	/	
Lindberg	/	
Schwab	/	
McCready	/	

FOUR-FIFTHS CALENDAR	
Ivancie	
Jordan	
Lindberg	
Schwab	
McCready	

Filed JAN 10 1980

GEORGE YERKOVICH
Auditor of the CITY OF PORTLAND

By *Jordan*
Deputy

INTRODUCED BY
COMMISSIONER IVANCIE

NOTED BY THE COMMISSIONER
Affairs
Finance and Administration
Safety
Utilities <i>[Signature]</i>
Works

BUREAU APPROVAL
Bureau: WATER WORKS
Prepared By: M. Lucas:jb Date: January 8, 1980
Budget Impact Review: <input type="checkbox"/> Completed <input type="checkbox"/> Not required
Bureau Head: <i>[Signature]</i> Carl Goebel, Administrator

NOTED BY
City Attorney
City Auditor
City Engineer