ITEM NO. 6.1

BOARD MEMORANDUM

DATE: July 1, 2019

TO: Board of Directors

FROM: Mike Alvord
Director of Operations and Maintenance

SUBJECT: Approve an Agreement with Water Quality & Treatment Solutions, Inc. for Expedited Bench-Scale Testing for PFAS Treatment Options

SUMMARY

In May 2019, SCV Water received results from the first round of a Division of Drinking Water (DDW) Order to sample 15 wells for the PFAS class of chemicals (per and polyfluoroalkyl substances). The results from 8 wells exceeded the State's Notification Levels for two specific PFAS chemicals - PFOS (13 ng/L) and PFOA (14 ng/L). One well exceeded the combined Response Level (70 ng/L) for PFAS. As the United States Environmental Protection Agency (USEPA) and State of California DDW regulatory levels are continuing to be modified and proposed, SCV Water is assessing the overall impact on existing supplies and determining how best to address the potential loss of supply capacity. An internal "PFAS Strike Team" has been organized to address potential impacts, develop and implement treatment strategies, evaluate and address operational constraints, and provide for accurate and timely communication with the SCV Water Board of Directors, Regulators, and the Public.

One of the first tasks facing SCV Water is to evaluate treatment technologies, since the timeline for obtaining treatment vessels and regulatory approvals is long. To that end, SCV Water requested and received a proposal from Water Quality & Treatment Solutions, Inc. (attached) for an Expedited Bench-Scale Testing for PFAS Treatment Options. The scope of work would help expedite the implementation of a treatment system at one or more wells and will include preliminary design and cost estimates.

DISCUSSION

In response to the Unregulated Contaminant Monitoring Rule Round 3 sampling, USEPA and DDW have implemented various health advisory levels and sampling orders for water utilities. In California, DDW issued an order for over 600 wells to be sampled throughout the state for PFAS chemicals. SCV Water is currently required to sample 15 of its 42 active wells quarterly over the next year. In May 2019, 14 of the required 15 wells were sampled for 14 PFAS chemicals. One well was not sampled because it is currently being repaired. Eight of the 14 wells exceeded one or more of the NLs for PFOS and PFOA and one well exceeded the combined RL. In accordance with Title 22, SCV Water notified Los Angeles County Board of Supervisors and the City Council for the City of Santa Clarita. In addition, as recommended by DDW, the well exceeding the RL was immediately taken out of service.

The SCV Water "strike team" has reached out to other water utilities, several consultants, and DDW to develop a proactive plan to address this emerging issue. Staff has received input from

DDW regarding pending issuance of further revised NLs and RLs. Therefore, it is imperative that SCV Water position itself to react properly and quickly to new regulations and the potential shutdown of additional wells. One of the first steps staff is recommending is to complete an evaluation of various treatment solutions and analyze the potential cost impacts of each solution, in order to choose the best alternative for ultimate implementation.

The attached proposal from Water Quality & Treatment Solutions, Inc. provides for an Expedited Bench-Scale Testing of PFAS Treatment Options using SCVWA's Groundwater along with Preliminary Design of Full-Scale PFAS Treatment Systems. There are currently 3 viable technologies for the removal of PFAS chemicals: adsorption on granular activated carbon (GAC), adsorption on synthetic ion-exchange (IX) resins, and filtration through reverse osmosis (RO) membranes. RO generates a high-salinity waste which presents disposal challenges for inland basins, like the Santa Clarita Valley, and is very energy intensive. Thus, the study will focus on GAC and IX removal systems. Bench testing is important to determine which media lasts the longest and performs the best for the cost. Testing multiple media types is also important when it comes to soliciting bids from various vendors. In correlation with the bench-scale testing, preliminary designs will be prepared along with cost estimates. Furthermore, this bench testing will generate much of the required information needed by the Division of Drinking Water (DDW) to ultimately permit the proposed treatment systems.

Staff has already conducted a significant amount of internal work, which has included an assessment of operational strategies to move water throughout the various distribution systems and specific pressure zones. With a current State Water Project Allocation of 75%, SCV Water will rely on a significant amount of imported supply should additional wells be taken out of service. Staff is also working with a consultant on public outreach and communication strategies. However, due to the long lead time of the procurement of treatment vessels, time to install complete treatment systems and time to get said systems permitted through DDW, it is critical that SCV Water immediately begins preparations for long term treatment options.

FINANCIAL CONSIDERATIONS

The proposed budget for bench testing ($85,000) and preliminary design ($50,000) is $135,000. The analytical costs will depend on the final conditions analyzed and the number of PFAS chemicals to be analyzed. The proposed number of samples to be analyzed is projected to be 143 with an expected cost of $65,000. This brings the total proposal with a not to exceed amount of $200,000.

In addition to the WQTS proposal, staff is also evaluating site restrictions and limitations at numerous well sites, which will require some outside services, including surveying. An additional $25,000 is requested for these efforts.

RECOMMENDATION

That the Board of Directors approve the Expedited Bench-Scale Testing for PFAS Treatment Options with Water Quality & Treatment Solutions, Inc. in the amount of $200,000 and additional field work as needed in the amount of $25,000 for a total project amount not to exceed $225,000.

Attachment

M65

WQTS
Water Quality & Treatment Solutions, Inc.
An environmental engineering and science consulting company

April 24, 2019

Mr. Stephen Cole
Assistant General Manager
Santa Clarita Valley Water Agency
26501 Summit Circle
Santa Clarita, CA 91350

Subject: Technical Proposal – *Expedited Bench-Scale Testing of PFAS Treatment Options from SCVWA's Groundwater and Preliminary Design of Full-Scale PFAS Treatment Systems*

Dear Mr. Cole:

On behalf of Water Quality & Treatment Solutions, Inc. (WQTS), I am pleased to submit to the Santa Clarita Valley Water Agency (SCVWA) this proposal to conduct expedited bench-scale testing of granular activated carbon (GAC) and Ion-Exchange (IX) resin for the removal of Perfluorinated Alkyl Substances (PFAS) from SCVWA's groundwater. The testing will be conducted at our facility in Los Angeles and will utilize water received directly from one of SCVWA's wells.

To help expedite the potential implementation of a treatment system at one or more of your wells, we have included Kennedy/Jenks Consultants as a subcontractor to lead the effort on preparing preliminary design and cost estimates for PFAS treatment systems at two of your wells to be identified at a later time.

In the preparation of this proposal, several assumptions were made in order to prepare the potential project cost. We look forward to discussing these assumptions with you and your Staff and making any necessary modifications before the proposal is finalized. Nonetheless, based on the current assumptions, the total cost is projected at $135,000 excluding the analytical cost.

Thank you for considering WQTS for your project, and we look forward to working with you on this important effort.

Respectfully Yours,
Water Quality & Treatment Solutions, Inc.

Issam Najm, Ph.D., P.E.
President

cc: Jeff Savard, Kennedy/Jenks Consultants
David Ferguson, Kennedy/Jenks Consultants

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EXPEDITED BENCH-SCALE TESTING OF PFAS TREATMENT OPTIONS FROM SCVWA'S GROUNDWATER AND PRELIMINARY DESIGN OF FULL-SCALE PFAS TREATMENT SYSTEMS

TECHNICAL PROPOSAL

(June 24, 2019)

BACKGROUND

The Santa Clarita Valley Water Agency (SCVWA) owns and operates a number of groundwater wells in the Santa Clarita Valley. These wells have a combined production capacity of approximately 52,000 gpm (74.5 MGD), which represents a critical component of SCVWA's water supply, especially in high demand periods. Based on recent water quality monitoring results, SCVWA discovered that eight wells currently contain elevated levels of perfluorinated alkyl substances (PFAS). PFAS are industrial chemicals that have been discovered in water supplies across the Country, and there is concern about the health impacts of these chemicals. There are thousands of variations on the chemical formulae of PFAS chemicals, which makes it impossible to know the extent of the contamination in any specific supply since many of these chemicals are not yet known. Nonetheless, there is a current list of 18 PFAS chemicals with verified analytical methods, and the list is growing.

From a regulatory perspective, there is no current primary or secondary Maximum Contaminant Limit (MCL) for any PFAS chemical, whether at the federal level or at the State level. However, two PFAS chemicals, specifically PFOA and PFOS, currently have California Notification Levels (NLs) and a California Response Level (RL). In addition, the USEPA has issued a 10-day Health Advisory (HA) for the sum of PFOA and PFOS. The California NL for PFOS is 13 nanograms per Liter (ng/L) and that for PFOA is 14 ng/L, while the RL is set at 70 ng/L for the sum of the two chemicals (PFOA+PFOS). This RL was set equal to the USEPA's 10-day HA for PFOS+PFOA (i.e., 70 ng/L).

A California NL is not an enforceable drinking water standard. However, based on the California requirements, if a water system exceeds the NL for a chemical in any of its sources, it is required to notify its governing body about the exceedance and include a notice about the exceedance in its annual Consumer Confidence Report (CCR). If a water system exceeds the RL for a chemical at any of its sources, the State requires that the system remove the source from service. Aside from these two PFAS chemicals, no other chemical currently has any health-related limit. However, the presence of industrial chemicals in drinking water supplies is clearly of concern to SCVWA and its customers.

The levels of PFAS chemicals detected in SCVWA wells are presented in Figure 1. The figure includes four charts: (A), (B), (C), and (D). Chart A is for PFOS , chart B is for PFOA, chart C is for PFOS+PFOA, and chart D is for all the other PFAS chemicals detected. These results are from samples collected on May 20, 2019. The charts show that seven (7) wells exceed the California NL of 13 ng/L for PFOS (Chart A), and nine (9) wells exceed the PFOA California NL of 14 ng/L for PFOA (Chart B). Only one Well (Valley Center) exceeds the USEPA HA of 70 ng/L (Chart C).

As shown in Figure 1, the Valley Center well is of primary concern because it exceeds all three levels of concern: The California NL for PFOS, the California NL for PFOA, and the USEPA HA for the sum PFOS+PFOA. The other wells of concern are the cluster of "N" wells, including N, N7, and N8, as well as the cluster of "S" wells, including S6, S7, and S8.

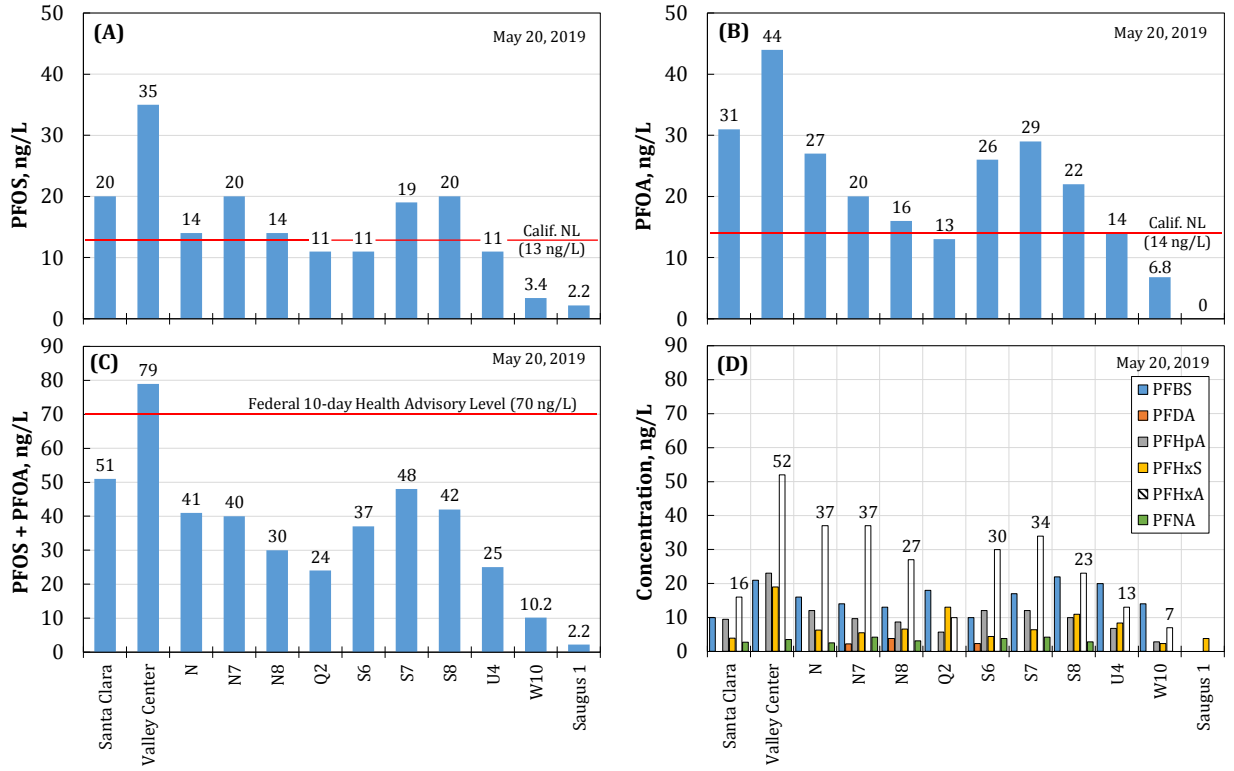

Figure 1 – Detectable PFAS Levels in Select SCVWA Groundwater Wells

PFAS TREATMENT ALTERNATIVES

There are currently three viable technologies for the removal of PFAS chemicals from water supplies:

1. Adsorption on Granular Activated Carbon (GAC)
2. Adsorption on synthetic Ion-Exchange (IX) Resins
3. Filtration through Reverse Osmosis (RO) Membranes

Removal through RO membranes, while technically viable, is highly impractical in the Santa Clarita Valley because it generates a high-salinity waste concentrate that cannot be disposed of in the local sewer, not to mention the fact that it is extremely expensive compared to the two other technologies. Therefore, for all practical purposes, there are only two viable PFAS treatment technologies at this time: (1) removal with GAC and (2) removal with IX resin. The proposed bench-scale testing will focus on these two technologies.

While there are standard design criteria for the GAC or IX treatment systems, there are fundamental questions that can only be answered with focused testing. These include:

1. Which GAC performs best for the money?
2. Which IX resin performs best for the money?
3. How long will the GAC or IX last before it must be replaced with new material?

The bench-scale testing proposed herein will focus on answering the above three questions using water from one of the most impacted wells to be selected by SCVWA at the start of the study.

VESSEL SELECTION

The two solutions being considered (GAC or IX) have virtually identical treatment train configurations in that they include passing the water through pressure vessels containing either GAC or IX resin. However, that is where the similarities end. The table below contrasts various important factors between the two treatment systems.

Parameter	GAC	IX Resin
Contact Time Required	Long(er) (~10 minutes)	Short(er) (~3 minutes)
Resulting Footprint	Large(r)	Small(er)
Resulting Capital Cost	Higher	Lower
Unit Cost	Low(er)	High(er)
Expected Life	Short(er)	Long(er)
Annual Replacement Cost	To be Determined	
Total Annual Cost	To be Determined	

The IX resin requires a shorter contact time (~3 minutes) compared to that required by GAC (~10 minutes), which means that an IX system requires a much smaller footprint than a GAC system. This is significant to SCVWA because of the limited space at each well site. However, if SCVWA sizes the system at a well for a 3-minute contact time, then it will not be able to convert it to GAC treatment in the future without adding more vessels. This forward limitation should be considered during the selection of the treatment system. It is noted that a system sized for GAC treatment (i.e., 10-minute contact time) can accommodate either IX resin or GAC at any time, which provides for added flexibility, especially if these vessels were to be re-purposes for VOC removal in the future.

The resin also has a higher expected operating time between replacements, which should reduce the replacement cost. However, the IX resin is close to five (5) times more expensive, on a ft^3 basis, than GAC. For this reason, it is uncertain whether the resin's lower replacement frequency compared to GAC will offset its higher unit cost.

GENERAL APPROACH

Two types of activities will be undertaken in this effort: The first is bench-scale testing of GAC and IX resin for PFAS removal, and the second is a preliminary design and cost estimate for PFAS treatment with either GAC and/or IX at two of the wells. Bench-scale testing will be conducted by WQTS, while the preliminary design and cost estimating will be conducted by Kennedy/Jenks.

Bench-Scale Testing

Bench-scale testing of PFAS removal with four GAC material and two IX resins will be conducted at the WQTS laboratory in Los Angeles, which is equipped with the experimental and analytical instruments required to efficiently conduct the tests. GAC testing will be conducted using the Rapid Small-Scale Column Test (RSSCT) procedure, while the IX resin testing will be conducted using a modified isotherm test as discussed below.

GAC Testing. The RSSCT is a bench-scale testing procedure used to estimate the replacement frequency of GAC at a full-scale treatment plant. The test procedure was developed at Michigan Technological University and has since become a standard test procedure in the water industry. Specifically, the RSSCT method is described in ASTM Standard Method D-6586-03 titled: "*Standard Practice for the Prediction of Contaminant Adsorption on GAC in Aqueous Systems Using Rapid Small-Scale Column Tests*". In this test, GAC is crushed to a smaller size (about 10 times smaller) and put into a small column, which becomes a small-scale replica of the large-scale vessel. The operating time for the small-scale column is a fraction of that for the large-scale vessel, allowing for a faster prediction of the time to breakthrough and the replacement frequency of the GAC in the full-scale application.

Four (4) RSSCT columns will be operated in parallel to test four different GAC material from four different GAC suppliers. This will ensure that SCVWA has multiple GAC options when full-scale implementation takes place. GAC suppliers may include Calgon Carbon, CABOT Norit, AqueoUS Vets, and Carbon Activated™.

IX Testing. Unlike GAC, there is no validated column scaling approach for bench-scale IX testing that can speed up the operating time of a small-scale column compared to that of a large-scale vessel. Therefore, a bench-scale column would need to operate at the same time scale as the large-scale system, which can be more than a year of operation. This is clearly noneconomical. As an alternative, WQTS proposes to utilize a batch isotherm test that projects the adsorptive capacity of different resins in order to project the anticipated full-scale life of the resin.

Two ion exchange columns will be tested in parallel with two different resins. One resin will be obtained from EVOQUA™ and one resin from PUROLITE™.

WQTS will transport water from the well to our facility for testing. Currently, we estimate a total of 20 55-gallon drums will be required. WQTS will bring 20 barrels on a truck to the well selected, fill the barrels with water from the well, and bring them back to our facility.

After receipt of the water, WQTS will begin testing the GAC and IX resins in parallel (after receiving approval from SCVWA for the selected GAC and IX resins). WQTS will conduct all testing and send all PFAS samples to EEA Laboratories for analysis. After the testing is completed, WQTS will prepare and submit a Technical Memorandum (TM) summarizing the testing procedures and their findings.

Preliminary Design & Cost Estimating

In parallel with the bench-scale testing, Kennedy/Jenks will prepare preliminary design and capital cost estimates for one GAC treatment system and one IX treatment system at each of two well sites. Kennedy/Jenks will utilize existing data, plans, maps, and information for this effort. No surveying, geotechnical investigations, or potholing is planned under this effort. The preliminary designs will include design criteria for each of the two treatment systems at each site, as well as layouts, site improvements, yard piping, and material and equipment selection. The preliminary design will be presented in a Preliminary Design Report (PDR) along with budgetary level estimates of the probably construction costs and detailed construction schedule.

SCOPE OF WORK

A – Bench-Scale Testing

This section identifies the specific tasks to be conducted and includes some discussion of the activities within each task.

Task A.1 – Prepare Test Plan. The test plan will document the materials and methods that will be used to conduct the bench testing. The plan will include all the materials used, the calculation used for setting up the RSSCT and IX tests, and the methods of sample collection and analysis. The draft test plan will be delivered to SCVWA for review and pertinent comments will be incorporated in the final test plan.

Task A.2 – Collect Raw Water & Prepare Bench-Scale Columns. In this task, WQTS staff will bring the barrels to the well and fill them up with untreated groundwater. In preparation for sample collection, SCVWA will need to pump the well for a sufficient period of time to achieve stable water quality that is representative of the aquifer water quality. WQTS will then transport the water back to our laboratory in preparation for testing.

In this task, WQTS will also acquire the pre-selected GAC and IX media and prepare the RSSCT tests by crushing the GAC to a smaller mesh size and rinsing it with distilled water until all the fines are removed. The GAC media will then be installed in the RSSCT columns. The IX resins will be used without modification.

Task A.3 – Operate and Monitor RSSCT Columns. Based on current assumptions, four RSSCT columns will be operated for a period of 14 days, which will be equivalent to 520 days of full-scale operation. During this period, samples will be collected from the influent and effluent of each column daily and will be sent to EEA Labs for PFAS analysis. A small subset the samples will be rushed with a 48-hr turn-around-time (TAT) in order to detect any anomalies in the results before the test is complete.

Task A.4 – Operate and Monitor IX Columns. Based on our current plan for designing the IX testing setup, individual mini columns will be set up to be used in the batch adsorption testing. The details of this testing procedure will be outlined in the Test Plan. The test will be conducted over five (5) weeks Samples will be collected once a week and analyzed for PFAS chemicals.

Task A.5 – Prepare Technical Memorandum. WQTS will prepare and submit a draft Technical Memorandum (TM) to SCVWA summarizing the results and making recommendations. After receipt of SCVWA comments, WQTS will finalize the report and submit it in electronic format.

B – Preliminary Design & Cost Estimating

This section identifies the specific tasks to be conducted under the Preliminary Design task and includes some discussion of the activities within each task.

Task B.1 – Data Gathering & Analysis. In this task, Kennedy/Jenks will conduct inquiries and investigations to acquire and analyze all relevant records of major utilities, property boundaries and right-of-way, as well as to document physical conditions, features, and constraints within the alternative Project sites. This includes the following: Acquire mapping, record drawings, and relevant information (aerial, utility, topographic, street improvements plans, geologic, environmental, etc.) from the Agency, City, County, and other public/agency sources.

Kennedy/Jenks will then perform a site reconnaissance of the Project sites to identify potential constraints. In addition, Kennedy/Jenks will complete an independent review and analysis of all gathered information to either confirm/validate the recommendations or suggest alternatives. Kennedy/Jenks will identify and discuss alternative recommendations early in the preliminary design stage.

Task B.2 – Preliminary Design. Kennedy/Jenks will develop the necessary design criteria for the proposed well treatment facilities (blending/treatment/disinfection systems) to allow for a comparison of alternatives including opinion of probable construction costs. The following are the anticipated subtasks under this effort:

Task B.2.1 – Draft Preliminary Design Report (PDR). Kennedy/Jenks will prepare a PDR that documents the basis of design and presents the design criteria associated with each of the Project facilities. The PDR shall represent a 20% design-level effort. At a minimum, the PDR will include:

- Recommendations will include detailed cost comparisons and development of preliminary site layouts (3 alternatives for the selected treatment facilities), inventory of necessary site improvements, yard piping, materials and equipment selection.
- The 20% design level site layout drawings will include the following disciplines: civil plans and sections, mechanical plans and sections, instrumentation and control diagrams, and electrical single-line diagrams.
- Anticipated system performance, site constraints, maintenance requirements, and lifecycle cost factors.
- Preliminary list of anticipated construction drawings and technical specifications (by discipline), including any special conditions for construction.

- Budgetary level estimate of probable construction costs (AACE Class 3) and detailed construction schedule.
- Layout drawings, equipment catalogue data/cut-sheets, pump performance curves, etc. which will be included as an appendix to the PDR.

Task B.2.2 –Preliminary Design Workshop. Kennedy/Jenks will participate in a preliminary design workshop to discuss and confirm the Project design basis, and will include a PowerPoint presentation of the Draft PDR to Agency staff to encompass all Project components.

Task B.2.3 –Final PDR. Kennedy/Jenks will incorporate all comments received at the Drat PDR presentation workshop into the Final PDR document. Kennedy/Jenks will submit an electronic copy (pdf) for Agency review. Agency comments on the Draft PDR will be incorporated into a Final PDR. Kennedy/Jenks will submit four (4) hard copies of the Final PDR including one (1) electronic copy (pdf).

C – Project Management

WQTS will take responsibility for the delivery of this effort to SCVWA. The project will begin with a kick-off meeting to be attended by WQTS and Kennedy/Jenks. The specifics of the project scope will be discussed. This meeting will also include the selection of the two well sites to be included in the Preliminary Design effort. WQTS and Kennedy/Jenks will also participate in two progress meetings to update SCVWA staff on the progress of both the bench testing and the preliminary design effort.

BUDGET

The overall cost for this effort is projected at $135,000 excluding the analytical cost. This includes $50,000 for the predesign effort, and $85,000 for bench testing. The analytical cost will greatly depend on the final conditions evaluated and the number of PFAS chemicals to be analyzed during the study. It is noted that the total number of samples collected and analyzed for PFAS is projected at 143 samples for all four GAC and two IX resin conditions. The analytical cost may be as much as $65,000. At this analytical cost, the total cost would be $200,000.