December 22, 1986

TO: The Members of the Board

FROM: EM Ed McCombs

REFERENCE: City of Westlake Village --
Blasting at the Three Springs Project

The City of Westlake Village has advised the District that it will be conducting hearings at its meetings of January 7 and 14, 1987 on the request for a permit to do blasting from the developer of the Three Springs project. In July 1986, Chief Engineer H. W. Stokes responded to an inquiry of the City Engineer of Westlake Village and set forth the conditions the District would require. Technical reports were prepared by geophysical consultants. These have recently been reviewed by Mr. Stokes and in the attached memo from him, he summarizes the situation. The key point is that the maximum allowable vibration to be permitted is 1/70th of the earthquake design criteria for our Westlake Dam. We have requested that the City of Westlake Village have a qualified technical expert supervise the actual conducting of the blasting.

We are sending this to you now in order that you have timely notice of an activity which will undoubtedly generate a good deal of media coverage.

The technical reports which we have received are available in my office for your review if you so desire.

EEM:pej

DATE: December 18, 1986

TO: Edward E. McCombs

FROM: H. W. Stokes HWS

SUBJECT: Blasting at the Three Springs Project 34835 42801
Vicinity of Westlake Dam

The developer of the housing project in Three Springs Valley adjacent to our Westlake Dam and reservoir is KLK Development Company. The layout of their tract requires blasting. The City of Westlake Village is processing a permit that will control the blasting. The requirements within the permit are based upon recommendations provided by the developer's blasting consultant, John J. McCormick of Gothman and McCormick, Inc. and the District. The City will provide appropriate supervision and inspection.

None of the blasting will be within 1000 feet of the Westlake Dam or pump station. Basically, the ground motion cannot exceed that allowed for residential development. This allowable vibration will not crack plaster walls. The vibration, when compared to the earthquake design criteria for our dam, is over 70 times less.

The City will carefully supervise the blasting program that has been designed in accordance with our requirements. I have no concern that the safety of the dam and pump station will be affected in any way by the developer's activities.

HWS:slc

RESOLUTION NO.

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WESTLAKE VILLAGE ISSUING A BLASTING PERMIT TO KLK COMMUNITIES INC. FOR GRADING OF TRACT 34835 AND 42801 (THREE SPRINGS)

THE CITY COUNCIL OF THE CITY OF WESTLAKE VILLAGE hereby finds, resolves and orders as follows:

Section 1. The Council does hereby find and determine that a request for a blasting permit was submitted by KLK Communities, Inc. to the City on August 1, 1986 for the Three Springs Project.

Section 2. Evidence was duly presented to and considered by the Council at its public meeting on December 10, 1986.

Section 3. The Council finds:

1. Evidence was presented by the City Engineer that blasting may be accomplished in accordance with appropriate standards of due care and diligence, based upon the attached conditions of approval, Exhibit "A".

Section 4. Therefore, the City Council of the City of Westlake Village does hereby grant the request for a blasting permit requested by KLK Communities, Inc.

PASSED, APPROVED and ADOPTED this 10th day of December, 1986.

ATTEST:

James E. Emmons, City Clerk

Prepared by: R. Dennis Delzeit, City Engineer

RDD:CSM:go
JN 3922

Proposed Conditions

"DRAFT"

EXHIBIT "A"

Resolution No. 161

1. The applicant shall conduct the blasting program in conformance with technical description as presented by Goffman and McCormick, Inc. in the August 1, 1986 Blasting Permit Application, attached herewith as Exhibit "A-1" and incorporated herein by reference. The blasting program shall be supervised by John McCormick.

2. The blasting program is to be inspected by a geotechnical representative of the City, acting on behalf of the City. Cost of the inspection services shall be provided by applicant as set forth in Condition No. 3.

3. Applicant has deposited the sum of Thirteen Thousand Dollars ($13,000.00) with the City. This sum shall be used to defray actual expenses to the City in the consideration and implementation of the blasting work. Such expenses shall include, but not be limited to, payment for services rendered by special consultants to the City, payment for the services of the City Engineer and his staff, payment for field services and inspection in conjunction with the blasting. Upon completion of the blasting activities, any unused portion of the funds shall be refunded to KLK Communities, Inc. If the actual expense exceeds the foregoing deposited amount, KLK Communities, Inc. will deposit the difference with the City prior to the issuance of a Certificate of Occupancy on the project.

4. Prior to issuance of a Certificate of Occupancy, all claims resulting from the blasting activity shall be resolved to the satisfaction of the City Manager upon recommendation of the City Attorney, upon verification that the applicant's insurance carrier or blasting contractor's insurance carrier exercised a good faith effort to resolve unsettled claims.

5. This permit shall not become effective until the following affidavit is filed and accepted by the City Clerk/City Manager: The applicant shall execute and furnish to the City an affidavit which states the applicant agrees to all conditions of approval of this blasting permit and agrees to indemnify and defend the City, its officers, employees, and agents, and Westlake Lake Management Association, its officers, employees and directors, against, and will hold and save them and each of them harmless from, any and all action, claims, damages to persons or property, penalties, obligations for liabilities that may be assessed or claimed as the result of the blasting allowed by this permit.

6. Actual blasting shall be permitted to occur only during the hours between 8:00 a.m. and 4:00 p.m. Exceptions to the 4:00 p.m. deadline may be made by the City Engineer upon demonstration by the applicant of extraordinary circumstances but under no circumstances shall blasting occur after 6:00 p.m. or dark, whichever is earlier.

7. Applicant shall provide for the safety of vehicles and pedestrians on adjacent roadways during blasting operations pursuant to regulations of the Los Angeles County Road, Sheriff and Fire Departments. All vehicular detainments and detours shall be subject to all conditions and prior approval by the Los Angeles County Road, Sheriff and Fire Departments.

8. This permit expires three (3) months from the date of adoption of this resolution. Extensions totaling a maximum of three additional months may be authorized by the City Engineer in the event inclement weather causes delay.

9. If, in the opinion of the City Engineer, the blasting operations create hazards or damage, are not conducted in accordance with the approved plan or with applicable quality and safety standards or otherwise constitute a detriment to the health, safety or public welfare, the Blasting Permit may be suspended immediately upon written order of the City Engineer to the applicant. The suspension shall remain in effect for such period as is required to rectify the problem identified by the City Engineer. The City Engineer's decision may be appealed to the City Council, which appeal shall be heard within seven (7) days of its filing with the City Clerk.

10. The applicant's blasting contractor, M.J. Baxter Drilling Company, shall execute and furnish to the City an affidavit which states the blasting contractor agrees to all conditions of approval of this blasting permit and agrees to indemnify and defend the City, its officers, employees, and agents, and Westlake Lake Management Association, its officers, employees and directors, against, and will hold and save them and each of them harmless from, any and all action, claims, damages to persons or property, penalties, obligations for liabilities that may be assessed or claimed as the result of the blasting allowed by this permit.

11. Applicant shall provide public liability insurance specifically covering liability for personal injury and property damage arising out of the blasting under this permit in the amount of $10 million dollars, which policy shall be primary coverage. This policy must include explosion hazard coverage. The blasting subcontractor hired by the applicant shall also provide primary public liability insurance coverage protecting its operations in the amount of $5.5 million dollars. Both policies shall be occurence-type policies, covering all personal injury and property damage arising from the blasting activity, regardless if such claims are not made or discovered during the policy period. The City of Westlake Village, its officers, employees and agents and Westlake Lake Management Association, its officers, employees and directors, shall be named as additional insured on both policies. The policies shall contain a clause prohibiting cancellation, modification or lapse without 30 days written notice first having been given to the City. Upon notice of cancellation, modification or lapse of the foregoing policies, this permit shall be immediately suspended. Certificates of insurance evidencing these policies shall be provided to the City as well as proof that premiums have been paid. Blasting activities approved by this permit shall not commence until all requirements of this condition have been satisfied to the satisfaction of the City Attorney.

MEMORANDUM

TO: Mayor and City Council

FROM: James E. Emmons, City Manager

DATE: January 7, 1987

SUBJECT: Request for Blasting Permit
Three Springs Ranch - CDP #86-1
Tract Nos. 34835 and 42801

BACKGROUND

Prior to incorporation of the City of Westlake Village the owners of the property known as "Three Springs Ranch" processed a grading plan through the County of Los Angeles and grading has been underway since early last summer. Like all major developments in the hilly areas around Westlake Village, areas of hard rock have been encountered during grading. The present developer of the property, KLK Communities, Inc., has requested permission to remove some of the hard rock areas by blasting.

In September, 1984 the City Council adopted Ordinance No. 54 which provides that all blasting or use of explosives is prohibited unless a permit with appropriate conditions is recommended by the City Engineer and approved by the Council. KLK Communities, Inc., has submitted an application for a blasting permit which is now before the City Council for consideration. The City Council has granted one previous permit for similar blasting to Pointe West Homes in 1984.

The request for a blasting permit for the Three Springs Ranch has been thoroughly reviewed and analyzed by the City Engineer, the City's geotechnical consultant, various public agencies and departments having interest and jurisdiction, as well as the State of California Division of Safety of Dams. The firm of Ryland Associates Inc., Geoscience Consultants, were retained to provide expert advise to the City Engineer relating to the geophysical aspects of blasting. Las Virgenes Municipal Water District, owner of the Las Virgenes Reservoir, the Los Angles County Sheriff's Department and the Los Angeles Fire Department have all reviewed the requested blasting permit and their comments have been incorporated into the conditions of approval for this permit.

The application for a blasting permit included a blasting program prepared by the firm of Goffman and McCormick Inc., which outlines the applicants plan for conducting the blasting. John McCormick, author of the program, is a well known expert in geology and geophysics and has become involved in evaluating dams, including effects of blasting, throughout the Western United States. Mr. McCormick also prepared the blasting program for the prior blasting permit for the Pointe West Project in 1984.

Jim Slossen and David Leeds, also consultants to the applicant, are nationally known experts in field of dam safety, geology, geophysics and seismology. They have addressed the issue of blasting in the proximity of the Las Virgenes Dam.

The Blasting Contractor, California Blasting and Drilling, has been in business for over 26 years, having worked on major projects which include blasting a notch in the existing Matilija Dam near Ojai, Westlake Village Dam, Las Virgenes Reservoir and Dam, Lake Sherwood Dam, and U.S Highway 101 at Conejo Grade.

The applicant has prepared an exhibit showing the areas of potential blast sites and the relationship to critical structures such as the Las Virgenes Reservoir Dam, structures and the adjacent residences. The exhibit is available for viewing at City Hall and will be on display during these hearings. Biographies of the technical experts to be heard during these hearings have been attached to this report.

ANALYSIS

The proposed blasting permit program will consist of a series of relatively small blasts which are to be precisely designed based upon specific details existing in the blast site, including geologic structure, a grading plan and distance to neighboring improvements. Because of the systematic nature in which the blasting is to be accomplished, the blasting effects are predictable within safe reasonable limits. The blasts occur deep in the rock structure and serve to fracture the rock into small pieces which can be handled with conventional construction equipment. To assure that the blasting program is precisely followed, the City Engineer recommends that the entire field blasting operation be subject to review and approval by a special Geophysicist hired by the City at the expense of the applicant.

As a result of the blasting, local residences may experience some ground motion and noise. Ground motion is similar to motion felt during a small earthquake except the movement is much less and for a shorter duration. Ground movements are usually measured in inches of movement per second (velocity). The noise experienced may be similar to a distant sonic boom or thunder storm.

The State of California, Division of Safety of Dams, indicated that ground movements exceeding six to eight inches per second would be necessary to create structural damage to the Las Virgenes Reservoir. The ground movement of two inches per second has been adopted by the U.S. Bureau of Mines as a reasonable criteria of ground movement for the threshold of possible minor damage to plaster and residential structures regardless of age, construction characteristics or geological conditions.

The 1984 permit issued to Pointe West restricted ground movement velocities at the Westlake Dam to one inch per second and to one half inch per second at neighboring residences. The Las Virgenes Dam is an earth filled dam with a clay core which has been determined to be very stable. The construction of this type of dam varies significantly from the construction of the concrete Westlake Village Dam. The Las Virgenes Municipal Water District, after consultation with the State of California Division of Safety of Dams has recommended the maximum ground movement at the dam be limited to two inches per second and limited to one half inch per second at the pump house adjacent to the dam. The pump house contains critical control instrumentation, metering devises, gauges and pumping equipment.

The City Engineer has recommended the condition which limits the blast size to produce ground movements not to exceed two inches per second peak particle velocity measured at the nearest point on the Las Virgenes Reservoir Dam and ground movements not to exceed one half inch per second of peak particle velocity measured at the nearest residence and at the reservoir pump house.

The applicant will conduct a very detailed interior and exterior inspection of any structure within 300 feet of the

blasting area prior to blasting activities, to authenticate any existing damage. If any claims should be made to the applicant as a result of the blasting activities a post blasting inspection will be conducted in order to facilitate the processing of such claims. The applicant shall name a representative who will be the contact person responsible to receive, review and to resolve all complaints and claims to the satisfaction of the City. This contact person shall be accessible during all periods of blasting.

To determine the insurance requirements placed upon the applicant, a survey was made of several jurisdictions to determine the minimum requirement necessary to protect the public entities. The survey proved very non-conclusive. There is no distinguishable established criteria for reasonable insurance requirements. The 1984 blasting program established a $10,000,000 insuranced requirement based upon potential damage to adjacent facilities including but not limited to the Westlake Village Dam and adjacent residential properties. The $10,000,000 insurance requirement has been carried over to this project.

While discussing this project with Las Virgenes Municipal Water District, they requested that the City require the applicant to name the Water District as additionally insured and to indemnify, defend and hold them harmless from actions or claims resulting from the blasting. The insurance and hold harmless conditions as recommended do include Las Virgenes Municipal Water District in accordance with their request.

The majority of complaints during the 1984 permit were noise related. As a condition of approval, the City Engineer recommends a limit of 129 decibels on the linear scale, metered at the nearest residence for noise and air vibration. This standard has been established by the U.S. Bureau of Mines. Because of the topography of the Three Springs Project, noise should not be a major concern, and with the enforcement of the condition, the applicant will be required to adjust his blasts to reduce noise and air vibrations when necessary.

To minimize the inconvenience to local residents resulting from the blasting, the blasting activities has been restricted to between the hours of 8:00 am and 4:00 pm and can only exceed those limits with expressed consent of the City Engineer.

The Los Angeles County Fire Inspector has visited and approved the proposed location for storage of the explosive magazine. The Fire Department issues separate permits to the blasting contractor which regulate the type of facilities to be used to transport and store explosives. During the 1984 blasting permit, magazines containing explosives were vandalized. To protect against this form of vandalism, the site chosen was somewhat remote, within a protective canyon, it will be fenced and the applicant will be required to provide a guard to assure security of the site while explosives are being stored during non-working hours.

To assure that the City's requirements are adhered to, this permit would give the City Engineer authority to suspend the blasting if the blasting operations are not conducted in accordance with the approved plan or if the operation creates hazards, or otherwise constitutes a detriment to health, safety or public welfare.

The City Engineer has carefully reviewed this request for blasting permit which has included meetings and discussions with various government agencies, review of technical data, and discussions, meetings, review and recommendation of the special consultant hired to assist the City. Based upon the information presented and the advise of the experts in the field, the City Engineer has prepared a list of conditions of approval which are attached to the resolution for the City Council's consideration granting approval of the blasting requested.

RECOMMENDATION

It is hereby recommended that the City Council grant permission to KLK Communities, Inc., for blasting. The appropriate motion is:

MOTION: I move that Resolution No. be introduced by title only, that further reading be waived and that Resolution No. be adopted.

ROLL CALL: Yes

PREPARED BY: R. Dennis Delzeit, City Engineer

RDD:CSM:sm4
Encl.
wv109a

RESOLUTION NO. 257

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF WESTLAKE VILLAGE ISSUING A BLASTING PERMIT TO KLK COMMUNITIES INC. FOR GRADING OF TRACT 34835 AND 42801 (THREE SPRINGS)

THE CITY COUNCIL OF THE CITY OF WESTLAKE VILLAGE hereby finds, resolves and orders as follows:

Section 1. The Council does hereby find and determine that a request for a blasting permit was submitted by KLK Communities, Inc. to the City on August 1, 1986 for the Three Springs Project.

Section 2. Evidence was duly presented to and considered by the Council at its public meetings on January 7, 1987 and January 14, 1987.

Section 3. The Council finds:

Evidence was presented by the City Engineer that blasting may be accomplished in accordance with appropriate standards of due care and diligence, based upon the attached conditions of approval, Exhibit "A".

Section 4. Therefore, the City Council of the City of Westlake Village does hereby grant the request for a blasting permit requested by KLK Communities, Inc.

PASSED, APPROVED and ADOPTED this ____ day of _____, 1987.

_____
John McDonough, Mayor

ATTEST:

_____
James E. Emmons, City Clerk

Prepared by: R. Dennis Delzeit, City Engineer

RDD:CSM:sm
JN 3922

EXHIBIT "A"

RESOLUTION NO. 257

CONDITIONS

1. The applicant shall conduct the blasting program in conformance with technical description as presented by Goffman and McCormick, Inc. in the August 1, 1986 Blasting Permit Application, attached herewith as Exhibit "A-1" and incorporated herein by reference. The blasting program shall be under the supervision of John McCormick at all times. duly licensed and credentialed personnel of

2. The blasting program is to be inspected by a Geotechnical consultant reporting directly to the City Engineer. The City's consultant has the authority to stop any blasting deemed incorrect, unsafe or otherwise potentially hazardous, until such time as all the requirements of the blasting program and these conditions are being complied with. Cost of the inspection services shall be provided by applicant as set forth in Condition No. 3.

3. Applicant shall deposit the total sum of Sixteen Thousand Dollars ($16,000.00) with the City. This sum shall be used to defray actual expenses to the City in the consideration and implementation of the blasting work. Such expenses shall include, but not be limited to, payment for services rendered by special consultants to the City, payment for the services of the City Engineer and his staff, payment for field services and inspection in conjunction with the blasting. Upon completion of the blasting activities, any unused portion of the funds shall be refunded to KLF Communities, Inc. If the actual expense exceeds the foregoing deposited amount, KLF Communities, Inc. will deposit the difference with the City prior to the issuance of a Certificate of Occupancy on the project.

4. This permit shall not become effective until the following affidavit is filed and accepted by the City Clerk/City Manager. The applicant shall execute and furnish to the City an affidavit which states the applicant agrees to all conditions of approval of this blasting permit and agrees to indemnify and defend the City, its officers, employees, and agents, and Las Virgenes Municipal Water District, its officers, employees and directors, against, and will hold and save them and each of them harmless from, any and all action, claims, damages to persons or property, penalties, obligations for liabilities that may be assessed or claimed as the result of the blasting allowed by this permit.

5. The applicant's blasting contractor, California Blasting and Drilling, shall execute and furnish to the City an affidavit which states the blasting contractor agrees to all conditions of approval of this blasting permit and agrees to indemnify and defend the City, its officers, employees, and agents, and Las Virgenes Municipal Water District, its officers, employees and directors, against, and will hold and save them and each of them harmless from, any and all action, claims, damages to persons or property, penalties, obligations for liabilities that may be assessed or claimed as the result of the blasting allowed by this permit.

6. Applicant shall provide public liability insurance specifically covering liability for personal injury and property damage arising out of the blasting under this permit in the amount of ~~$1 million~~ $1 Million dollars, which

policy shall be primary coverage. This policy must include explosion hazard coverage. The blasting subcontractor hired by the applicant shall also provide primary public liability insurance coverage protecting its operations in the amount of ~~$5~~ $6 million dollars. Both policies shall be occurrence-type policies, covering all personal injury and property damage arising from the blasting activity, regardless if such claims are not made or discovered during the policy period. The City of Westlake Village, its officers, employees and agents and Las Virgenes Municipal Water District, its officers, employees and directors, shall be named as additional insured on both policies. The policies shall contain a clause prohibiting cancellation, modification or lapse without 30 days written notice first having been given to the City.

7. The applicant shall conduct a monitoring program as approved by the City Engineer. The maximum acceptible limits of peak particle velocity at the Las Virgenes Reservoir Dam is two inches per second, the maximum acceptable limit at the pump house and at adjacent residences is 0.5 inches per second. The maximum acceptable limit for noise and air shock shall be 129 decibles on the linear scale, metered at the nearest residence. Copies of all blasting logs as well as the vibration and noise studies shall be provided to the City.

8. Actual blasting shall be permitted to occur only during the hours between 8:00 a.m. and 4:00 p.m. Exceptions to the 4:00 p.m. deadline may be made by the City Engineer upon demonstration by the applicant of extraordinary circumstances but under no circumstances shall blasting occur after 6:00 p.m. or dark, whichever is earlier.

9. The applicant shall conduct a very detailed interior and exterior inspection of any structures within 300 feet of ~~blast the~~ blasting sites prior to blasting activities to authenticate the presence of any existing damage. If any claims should be made to the applicant as a result of blasting activities, a post-blasting inspection will be conducted in order to facilitate the processing of any such claims.

10 The applicant shall name an authorized representitive whose duties shall include receiving complaints from the community concerning blasting, research and follow through with the resolution of the problems to the satisfaction of the City Engineer, provide written log and files of all complaints received and the resolution of each. The representitive shall be on call during all periods when blasting is taking place.

11. Prior to issuance of a Certificate of Occupancy, all claims resulting fror the blasting activity shall be resolved to the satisfaction of the City Manager upon recommendation of the City Attorney, upon verification that the applicant's insurance carrier or blasting contractor's insurance carrier exercised a good faith effort to resolve unsettled claims.

12 This permit shall co-exist with the Tract(s) grading permit and shall expire and/or be extended with the grading permit upon approval of the City Engineer.

13. If, in the opinion of the City Engineer, the blasting operations create hazards or damage, are not conducted in accordance with the approved plan or with applicable quality and safety standards or otherwise constitute a detriment to the health, safety or public welfare, the Blasting Permit may be suspended immediately upon written order of the City Engineer to the applicant. The suspension shall remain in effect for such period as is required to rectify the problem identified by the City Engineer. The City Engineer's decision may be appealed to the City Council.

14. The blasting contractor shall obtain and abide by all necessary permits from the Los Angeles County Fire Department for the use, transportation, and storage of explosive materials. In addition, the storage site shall be approved by the City Engineer and shall be fenced to prevent unwarranted access. ~~The applicant shall provide a guard for the site during non-working hours when explosives are being stored.~~ The location and all security measures shall be approved by the City Engineer and shall be maintained in a safe manner acceptable to the City Engineer.

15. No blasting shall take place until the applicant has provided evidence to the City Engineer that all of the conditions of this permit have been complied with, including schedules which provide that the applicant's consultants and the City's consultants can be present during all of the blasts. The applicant must have received authorization from the City Engineer a minimum of 24-hours before each blast can occur.

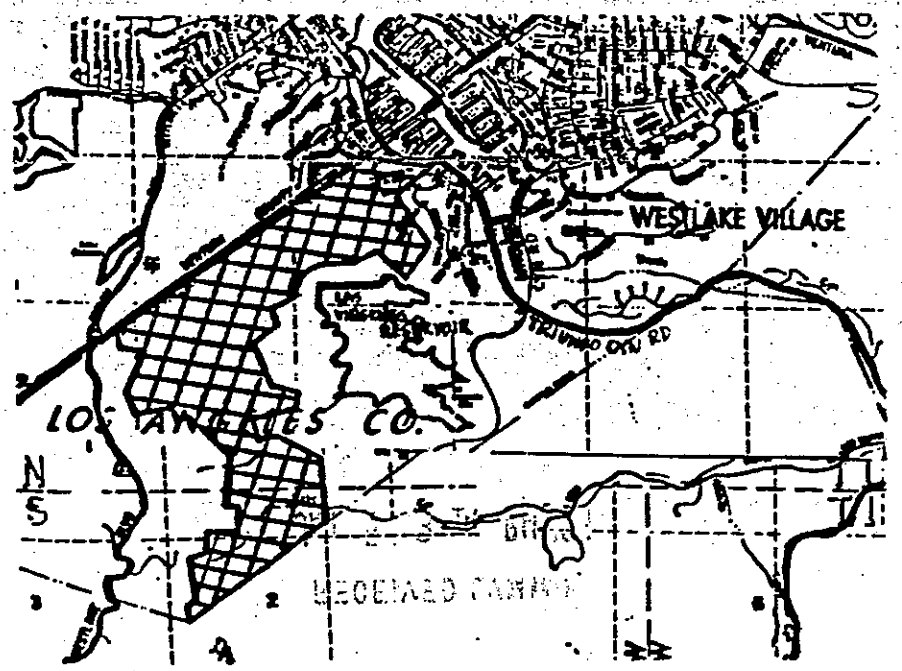
RDD:CSM:sm3
wv109a

NOTICE OF PUBLIC HEARING

COMMUNITY DEVELOPMENT PROJECT NO. 86-1

Notice is hereby given that the City Council of the City of Westlake Village will conduct a public hearing to consider an application by KLK Communities, Inc., for a permit to provide for blasting in conjunction with grading operations on recorded Tract Nos. 42801 and 34835 (Three Springs). The application is submitted in accordance with Ordinance No. 54 (Blasting Regulations) of the City of Westlake Village Municipal Code.

Said public hearing will be held at 7:30 p.m., January 7, 1987 in the Council Chambers, 31824 Village Center Road, Westlake Village, California. Testimony regarding the proposed project may be presented at that time. All documents and other materials pertaining to the proposed project may be reviewed at City Hall beginning December 31, 1986.



31824 W. VILLAGE CENTER ROAD • WESTLAKE VILLAGE, CALIFORNIA, 91361 • (818) 706-1613

RYLAND ASSOCIATES, INC.
GEOSCIENCE CONSULTANTS

Geophysical and Geological Exploration
Engineering Seismology
Mining Consultation

2400 East Foothill Boulevard
Pasadena, California 91107
(818) 792-6162

SEP 25

REC 9/26/86

New Address:
2569 E. Colorado Bl.

September 20, 1986

City of Westlake -City Engineer Office
31844 Village Center Road
Westlake Village, CA 91361

Re: Three Springs Project, Blasting Permit

Dear Mr. Delzeit:

I have reviewed the report from John McCormick dated August 1, 1986 regarding the planned blasting program. This report provides adequate data for preparation of the blasting permit.

In general I think the format of the permit prepared for the nearby Pointe West project will be also appropriate for the Three Springs project. However, a few notes should be made either as a portion of the permit or as a separate letter by reference:

*The permit should refer to the McCormick report as the technical description of the program.

*The values of non-exceedence (0.5 ips for structures 2.0 ips for the dam) should be included in the permit.

*The city will issue a temporary "CEASE OPERATIONS" letter if these criteria are significantly exceeded (the tolerence could be about 10% but this should not be detailed to the permitee). After the blast has been investigated and measures taken to abate future exceedence the program can then continue. This would be generally done in the field by me or my staff and reported to your office. Repeated or gross violations could call for longer-term or total terminations.

*The permittee should name a particular person as public relations liason to handle complaints. This could be one of the field engineers of the contractor or McCormick. This worked well at Pointe West and I think people were better served and less hostile when they had a particular person to speak to. I will also review the complaints and report to you.

*The McCormick report suggests that blasts where the scaled distance (distance to blast/square-root of explosive pounds per delay) is greater than 400 would not require monitoring. This appears to be logical and will save everyone money. However, this clause should be contingent on the results of the first few blasts-it could require some modification. The city should obtain a file copy of the blasters log as well as the vibration studies so that all blasts can be accounted for with respect to time, size, etc.

*Many of the complaints at Pointe West were probably more from noise than actual vibration. An acoustic limit is difficult to evaluate but if there are significant complaints in this respect such a limit can be imposed based on previous recorded data at the site.

*The seismologist (or blaster when the blasts are not recorded) should note occurences of fly rock or hole "blow outs"-these affect the acoustic levels and public perception of the blasting program and may relate to complaint level.

As I mentioned these factors could be included directly in the permit (primarily in items 1 and 9 such as in Pointe West) or by referenced technical specifications.

Please contact me if you have any questions or require further information. If you would like my comments directly on the actual permit or in preparation for public hearings please let me know.

Best regards,

Stephen Ryland
Geophysicist

1 AUG 86 AM 10

KLK COMMUNITIES, INC.

File Blasting Permit

August 1, 1986

Mr. James E. Emmons
City Manager
CITY OF WESTLAKE VILLAGE
31844 Village Center Road
Westlake Village, California 91361

RE: Blasting Permit Application - Three Springs Project
KLK Communities, Inc.
Tracts 42801 and 34835
Westlake Village

Dear Mr. Emmons:

This is the written application of KLK Communities, Inc. for a blasting permit for the Three Springs project. This application is submitted in accordance with Ordinance 54 (Blasting Regulations) of the City of Westlake Village Municipal Code. The application includes a Table of Contents of the subjects included in our plan for conducting the necessary blasting.

In developing this plan we have had the assistance of professionals who clearly recognize their principal obligation as the protection of the public health, safety and welfare.

This plan includes a description of the justification for blasting, adoption of ground vibration limits specified by the Las Virgines Municipal Water District and State of California; Division of Safety of Dams, preblast inspections/ notification of neighbors, notification of authorities; seismographic monitoring of blasting, record keeping and reports.

We have engaged the firm of Goffman & McCormick, Inc. to provide assistance in implementing the plan. They have had extensive, recent experience with successful blasting projects in the Cities of Westlake Village and Thousand Oaks.

Our negotiations with blasting contractors are dependent upon establishing the conditions of the blasting permit. In order to avoid a bottleneck in the grading operations we would like to begin negotiations with a blasting specialty contractor as soon as possible.

Your early response to this application is sincerely appreciated.

Very truly yours,

KLK COMMUNITIES, INC.

Bill Krim ms

William B. Krim
President
cc: D. Delzeit

MAILING ADDRESS: POST OFFICE BOX 4645 ▪ THOUSAND OAKS, CALIFORNIA 91359

BLASTING PERMIT APPLICATION
FOR
KLK COMMUNITIES, INC.
CITY OF WESTLAKE VILLAGE, CALIFORNIA

TABLE OF CONTENTS

Our Project 86-50

BLASTING PERMIT APPLICATION
CITY OF WESTLAKE VILLAGE, CALIFORNIA

Applicant: KLK Communities, Inc.
31320 Via Colinas, Suite 110
Westlake Village, California 91362

Mailing Address: P.O. Box 4645
Thousand Oaks, California 91359

GENERAL LOCATION OF BLASTING

The blasting will be performed within the Three Springs project, Tracts 42081 and 34835, comprising about 285 acres located southerly from Triunfo Canyon Road at Three Springs Drive.

The project includes 481 recorded lots. It is anticipated that the grading of about 40 to 50 lots and associated streets will require some blasting to fracture hard, volcanic rock. Trenches for underground utilities located in cut (excavated) areas will also require blasting.

JUSTIFICATION FOR BLASTING

This request for a blasting permit is made because some of the rock to be excavated in accordance with the approved grading plan is too hard for conventional grading equipment to remove without drilling and blasting to create fractures in the rock.

Geologic field mapping, test trench excavation, test drilling, geophysical exploration employing the seismographic refractive technique, ripping tests and current grading operations indicate some of the Conejo volcanic rock materials, consisting of basaltic agglomerate and andesite, will require systematic drilling and blasting to develop rock fractures to enable the rock to be excavated.

A portion of the proposed excavation is in rock materials which have been classified by seismic refractive testing as representing very difficult ripping to unrippable in terms of the capability of modern, heavy construction equipment.

The necessity for blasting on the Three Springs project has been established by a full-scale ripping test. The actual quantity and precise locations of rock to be blasted cannot be determined until grading operations are in progress at specific locations. The amount of rock fractured by blasting shall be the smallest amount practicable.

Seismic Refractive Tests - About 45 seismic refractive tests have been made by Gorian and Associates, project geotechnical consultants, in planned cut areas throughout the project. The purpose of these tests was to determine the seismic velocity of the subsurface rock. The rippability of rock material is related to seismic velocity, geologic structure, ripping

equipment weight, horsepower and operation. These tests have identified rock which is potentially unrippable.

Ripping Test - A rock ripping test was performed on Lot 244, Tract 34835 on July 15, 1986. The test was observed by Ron Wilson, inspector representative of the City Engineer and others. The Caterpillar Company Model D-10 dozer equipped with a double shank hydraulic ripper was used in the test. This is the largest and most powerful ripping equipment available. The machine weighs ~~200,000~~ over 300,000 pounds and is driven by a 700 horsepower engine. The purpose of the test was to correlate seismic velocity with ripping production at a specific location. The higher the velocity, the harder the rock. Seismic Traverse, ST-13, was run at this location by Gorian and Associates, Inc. and reported in their Geotechnical Investigation Report of March 28, 1978. The results reported were as follows:

Depth (feet)	Velocity (feet per second)
0-2	1136
2-13.5	2666
below 13.5	12,280

During the ripping test, the dozer excavated an area about 20 feet by 20 feet to a depth of about seven feet below the natural ground surface in 2½ hours, a rate of about 40 cubic yards per hour. During the final hour of ripping in the seven to eight feet depth range, the rock was unrippable. The rippers just scratched the rock surface. The seismic velocity of the rock at the seven to eight foot depth was estimated to be in the 8,000 to 9,000 feet per second range. The seismic test indicated 12,280 feet per second rock at a depth of 13.5 feet. The design cut on Lot 244 is 44 feet. A thickness of about 37 feet of unrippable rock remain to be excavated on Lot 244. Lots 243 through 249 (seven lots) and the Peachwood Place roadway in this same rock ridge have design cuts varying from 40 to 49 feet in depth. There is no alternative to blasting.

BLASTING OPERATIONS - GENERAL

(a) Preblast inspections shall be made of all residences and other buildings located within 300 feet of the blasting areas. Inspections shall be made in the company of the owner or owners' representative of the property. Property inspections shall identify specific conditions

judged to be sensitive to the effects of blasting. Blasting procedures shall be adopted to accommodate structural conditions noted. Inspection notes and photographs of existing conditions shall serve as a basis for determining whether existing structural conditions are aggravated or improvements damaged by blasting effects. Inspections shall be made by a civil engineer licensed by the State of California and not in the regular employ of the owner or blasting contractor.

(b) Vibratory ground motion and airblast shall be maintained within safe limits as prescribed by the U. S. Bureau of Mines and the Las Virgenes Municipal Water District.

(c) Vibratory ground motion and airblast created by project blasting will be seismographically monitored to determine that blasting effects are within safe limits as prescribed by the U. S. Bureau of Mines and the Las Virgenes Municipal Water District.

(d) Blasting operations shall be performed by a well-qualified blasting specialty contractor who has a performance record of successful and safe rock

fracture blasting in the Agoura-Westlake-Thousand Oaks-Newbury Park areas. The blasting contractor shall possess the "state of the art" knowledge of blasting procedures, commercial blasting supplies and accessories for performing safe, controlled blasting.

(e) The blasting contractor shall provide a certificate of insurance to indemnify the City of Westlake Village and neighboring property owners against potential blasting damage.

(f) Construction Safety Orders of the State of California shall be complied with.

EXISTING IMPROVEMENTS

Existing residential improvements in the vicinity of the project are the Parkwood Estates community in the City of Westlake Village, located southerly from Tract 42801 and South Shore Hills in the City of Thousand Oaks, located northerly from Tracts 42801 and 34835.

Las Virgenes Reservoir, impounded by two zoned earthfill embankments, is located in the City of Westlake Village adjacent to the southeasterly limits of Tracts 42801 and 34835.

LAS VIRGENES RESERVOIR

Las Virgenes Reservoir (constructed as Westlake Reservoir) is the most critical, although not the most sensitive improvement in the area relative to the effects of blasting within the Three Springs project. The critical nature of Las Virgenes Reservoir is obvious considering the volume of water stored and the extensive development and large population located downstream from the dam.

Fortunately the design, construction and surveillance of Las Virgenes Reservoir has been specifically directed to its ability to withstand earthquake effects. The proposed blasting activity will cause much less vibration with much shorter duration than the shaking of the natural earthquakes to which the dam has been exposed since its construction and for which the dam has been designed and constructed.

The following is taken from Exhibit A -- Slosson and Associates letter, June 19, 1980, attached.

"In reviewing the capability of Westlake Dam to withstand the effects of earthquakes, the Board of Consultants considered the following favorable characteristics of the site and structure, all of which have been documented:

(1) The highly competent foundations of massive and sound volcanic rock throughout for the structures, and the absence of detrimental geologic features which might affect the structures adversely by localized tectonic displacements, or otherwise.

(2) The strong rolled earth-rock shells of the embankments, which are not susceptible to appreciable loss of strength under reversing cyclic loading, and which would effectively minimize deformations induced by earthquake shaking.

(3) The favorable properties of the core materials, affording adequate plasticity for avoiding formation of cracks.

(4) The conservatively designed and carefully constructed filter and drain zones, which protect the core against seepage-induced migration of earth particles, and which isolate the downstream shell zones against intrusion of seepage flow, both under normal operating conditions and in the event of any reasonably expectable deformations resulting from an earthquake.

(5) The exceptionally favorable configuration of the main embankment, which is buttressed downstream and upstream near its midpoint by prominent mounds in the rock formations, affording significant restraints to the embankment not taken into account in the conventional two-dimensional analysis of stability.

The conclusions by Wahler and Associates that the most critical potential earthquake would be one with magnitude 8 originating on the San Andreas fault, which might produce horizontal accelerations up to about 0.25g in the vicinity of Westlake Reservoir, with shaking of this order of intensity lasting about 40 seconds, are in reasonable accord with the findings of other qualified investigators."

Exhibit B -- David J. Leeds and Associates letter of June 18, 1980 is attached. This letter addresses potential ground motion/vibration/seismic activities associated with earthquake, blasting and construction equipment as relates to the Las Virgenes

Reservoir and existing residences in the vicinity of the Three Springs project. This application for a blasting permit and accompanying blasting plan provides for those concerns identified in Exhibit B.

The Las Virgenes Municipal Water District has been contacted with regard to conditions governing blasting in the vicinity of the dam and reservoir. Exhibit C -- Las Virgenes Municipal Water District letter to the City of Westlake Village dated July 25, 1986 is attached. The following is taken from the letter.

> "We have no objections to the use of blasting for development of the property near the toe of Westlake Dam as long as the earth vibrations are limited to the following maximum particle velocities:
>
> 2.0 inches per second in the foundation adjacent to any part of the dam embankment;
>
> 0.5 inches per second in the foundation adjacent to the pump station at the toe of the dam."

Although the limits are very conservative and restrictive for structures of this type, this blasting plan provides for limiting ground vibration to the limits specified by the Las Virgenes Municipal Water District.

The vibration limits specified were established as a result of communication by the Las Virgenes Municipal Water District with its consultants and the State of California, Division of Safety of Dams.

The strictness of the blasting vibration limit with respect to the dam foundation adjacent to any part of the embankment is illustrated by the following:

(1) Exhibit A indicates the factor-of-safety of the dam stability with respect to vibration is about 30 percent greater than required by the State of California and the Federal Government.

(2) The 2.0 inches per second vibration limit in the dam foundation allows less than one seventy-fifth (1/75) of the ground motion displacement provided for by the pseudostatic stability analysis performed by the dam designer, based on a lateral force seismic coefficient of 0.25g. In other words, at 2.0 inches per second, the dam is capable of accommodating at least 75 times more vibratory ground motion displacement by virtue of specific design and construction details. (Assumes simple harmonic ground motion, and frequencies of 10 Hz blasting and 1 Hz earthquake).

(3) Ground vibrations produced by a particular blast design are predictable within reasonable limits. The ground vibration is not precisely predictable. Therefore the requirement for maintaining ground

vibration below a given limit means that the blast design must be conservative so as not to exceed the limit. The typical job experience is that more than one-half of the blasts produce less than one-half of the allowable ground vibration. With a limit of two inches per second, typically more than one-half of the results would be less than one inch per second.

(4) The pump station is located adjacent to the toe of the dam. The vibration limit specified for the pump station is 0.5 inch per second. This limit is only one-fourth of that allowed for the dam foundation. In effect, the actual vibration limit for the dam is therefore only 0.5 inch per second, an inconsequential amount of vibration by any recognized standard. Given the task of maintaining vibration levels below 0.5 inch per second at the toe of the dam means that more than about one-half of the blasts will produce less than one-half of the 0.5 inch per second vibration limit at the toe of the dam. More than one-half of the blasts will produce less than 0.25 inch per second peak particle velocity at the dam.

(5) The elevation of the pump station at the toe of the dam is about 901 feet. There are no potential blast sites within the Three Springs project with finish grade elevations lower than about 930 feet which are located within 1000 feet of the dam. The potential blast sites are located on steep hillside terrane above the pump station. The combination of elevation difference and hillside blast sites provides for favorable lateral relief of the blasting forces. The blasting will tend to be relieved in the direction of least resistance, i.e., horizontally rather than concentrated in the downhill direction of the toe of the dam. Observations during recent blasting experience on the Pointe West project adjacent to Westlake Dam were in accordance with this theory of blast energy relief.

BLASTING OBJECTIVES

The objectives of the blasting are to fracture natural in-place rock to the approved grading plan lines and grades and to provide a rock product which can be excavated and placed as compacted fill. Although each blast is different with respect to instant conditions in the blast site, the objective of blast

design will be to develop procedures which are essentially uniform, systematic and repetitious. The instant site conditions which can be variable for each blast include drilling characteristics of the rock, rock structure, degree of rock weathering, geometry of the rock mass, open face development (relief) and the location of the blast with respect to neighboring improvements.

The establishment of blasting operations which are essentially uniform, systematic and repetitious will be an evolutionary process.

Drill hole spacing, depth, location and explosive loading will be in accordance with instant blast area rock conditions as determined by drilling and visual observations, the grading plans and allowable explosive quantities per delay period.

Explosive supplies shall be used in accordance with the technical recommendations of the manufacturer and the Institute of Makers of Explosives.

All blast holes shall be carefully stemmed with inert granular material and individual blast holes will be loaded with due recognition of instant rock fracture and burden conditions.

VIBRATION LIMITS

The amount of vibratory ground motion at any location in the vicinity of a blast site is dependent on two variables:

1. The distance between the blast and the location of interest.

2. The quantity of explosive detonated per delay interval.

It is proposed that blasting be conducted in such a manner that the vibratory ground motion at Las Virgenes Reservoir not exceed the maximum particle velocity limits specified by the Las Virgenes Municipal Water District, the owner of the dam. Those limits specified in Exhibit C attached, are as follows:

2.0 inches per second in the foundation adjacent to any part of the dam embankment.

0.5 inch per second in the foundation adjacent to the pump station at the toe of the dam.

It is further proposed to limit the vibratory ground motion at the nearest private residential property to the blast site to a peak particle velocity of 0.5 inch per second.

CONTROLLED BLASTING

Quantitative vibration limits have been proposed for the project, viz. 0.5 inch per second for the dam pump station and private residences and 2.0 inches per second for the dam embankment foundation. Additional control of blasting effects is imposed by consideration of the stability of rock slopes created by the blasting. Overshooting cannot be tolerated.

Controlled blasting refers to limiting the amounts of explosive detonated per delay period with regard to its location with respect to dam, pump station, house and slope.

The precise design of blasts will be based on specific details existing in the blast site, including geological structure, the grading plan and the distance to neighboring improvements. In order for blasting to be conducted within the specified guidelines it must be performed in a systematic manner and the blasting effects must be predictable within reasonable limits.

Explosives and the related blasting accessories used are to be standard commercial products whose performance is established.

Until the unrippable rock is exposed and its geometric relationship to the grading plan is determined, discussions of the blast configurations must be in general terms.

The blast hole diameters will be in the range of about two and one-half inches to four inches. Blast hole diameter will not exceed six inches.

Blast hole depths will vary from about 8 feet to about 24 feet. The depth will be controlled by the location of the blast with respect to the grading plan.

Blast holes will be drilled vertically on a uniform pattern in proportion to their diameter. For example, two and

one-half inch diameter holes would be drilled in a square or rectangular pattern with spacing of about five to six feet. Three inch diameter holes would be drilled on a spacing of seven to eight feet.

Blasts will be initiated by a controlled delay system; electric or gas. This procedure shall provide for a time delay interval of at least 10 milliseconds between detonation of individual blast holes, and if necessary, a delay interval between individual charges in the same blast hole. Typically, the delay interval will be 25 to 50 milliseconds, although delays as short as 10 milliseconds could be used. A millisecond is one-thousandth of a second. Millisecond delays provide improved fragmentation, controlled rock movement and reduced ground vibration and airblast as compared with a simultaneous detonation of the blast.

Exposed detonating cord shall be prohibited.

The allowable quantity of explosive to be detonated per delay period will be based upon the results of seismographic recordings at the dam and the closest residences. There is a mathematical relationship among explosive quantity, distance and ground motion. That relationship for this blasting site will be determined by the instrumental results. The allowable quantity of explosive, termed pounds per delay period, will be that amount,

applied at a given distance, which does not produce more than 2.0 inches per second peak particle velocity at the dam embankment and does not cause more than 0.5 inch per second peak particle velocity at the dam pump station and the nearest residence.

INSTRUMENTATION

Seismographic instrumentation used to monitor project blasting shall provide permanent photographic records of vibratory ground motion particle velocity in three mutually perpendicular directions. The seismic systems will automatically record a calibration pulse on each component each time the instrument is turned on to document the gain setting for each seismogram independently of the operator.

SCALED DISTANCE

Scaled Distance is the distance in feet between the blast location and the location of interest (Las Virgenes Reservoir and/or private residence) divided by the square root of the maximum pounds of explosive detonated per delay period. A delay period has a duration of 10 milliseconds or more for this blasting plan.

The units of Scaled Distance are "feet/pound$^{\frac{1}{2}}$."

SEISMOGRAPHIC MONITORING

Portable seismographic instruments will be used to monitor project blasting. The instruments will be placed at the closest portion of the dam embankment and/or the pump station at the toe

of the embankment and at the closest residence to the blast location for all blasts with a Scaled Distance of 400 feet/pound$^{\frac{1}{2}}$ or less. Blasts with a Scaled Distance greater than 400 feet/pound$^{\frac{1}{2}}$ have a very low probability of producing a peak particle velocity as high as 0.05 inch per second which corresponds to only 10 percent of the lowest project vibration limit. That limit pertains to the dam pump station and private residences. The purpose of this Scaled Distance criterion is a matter of logic. Within Tract 34835, some of the potential blasting sites are in the 3000 to 4000 feet distance range (more than one-half mile) from the dam and private residences. Seismographic monitoring of blasts with Scaled Distances of greater than 400 feet/pound$^{\frac{1}{2}}$ would serve no useful purpose. U. S. Bureau of Mines research (RI 8507) states that blasts with a Scaled Distance of 70 feet/pound$^{\frac{1}{2}}$ or more are conservative and can be assumed to be safe and produce less than 0.5 inch per second particle velocity.

NOTIFICATION

The City Engineer and Fire Authorities shall be notified by telephone at least 24 hours prior to blasting of the intention to perform blasting. On the day of blasting, the City Engineer and Fire Authorities shall be notified of specific blast details by telephone before each blast.

Blasting signals specified by the Construction Safety Orders of the State of California shall be sounded to notify persons of the impending blast.

RECORDS

Blasting records including blast location, date, time, explosives quantity, delay periods, blast hole diameters and depths and stemming and seismographic results shall be available to the City Engineer at all times. Upon the completion of blasting, a summary report of seismographic results shall be submitted to the City Engineer.

BLASTING COMPLAINTS

Any blasting complaints shall be accurately recorded by the permitee as to the complaint, address, date, time, nature of the complaint, name of person receiving the complaint, and the complaint investigation conducted. Complaint records shall be available to the City Engineer at all times.

MITIGATIVE CONDITIONS

Factors which will mitigate excavation blasting effects at the improvements in the vicinity of the Three Springs development include:

1. The horizontal distance between the dam pump station and the major portion of anticipated blasting is relatively great; more than 1000 feet.

2. The elevation of the pump station at the toe of the dam is well below the lowest elevation of most of the anticipated blasting.

3. The steep natural topography of the construction site and the tract grading plan provides for natural lateral relief of the blasting forces.

4. Controlled construction excavation blasting methods must be employed in order to preserve the stability of the permanent slopes within, and adjacent to, the tract. Excessive blasting cannot be tolerated. Controlled blasting methods limit the quantity of explosive detonated per delay period and the intensity of vibratory ground motion.

5. The attenuation of vibratory ground motion with respect to distance in this rock terrane will be relatively high; typically in the range of the -1.5 to -1.8 power of distance. In effect, this means for a given size blast, a doubling of the distance between blast and point of interest will reduce the ground vibration to about one-third the original amount. This observation is based upon seismographic monitoring experience with blasting projects in volcanic rock in the Agoura, Westlake, Thousand Oaks and Newbury Park areas during the past fifteen years.

6. The duration of individual blasts will be short. The frequency of the vibratory ground motion will be relatively high. The natural frequency of the dam is relatively low. The mismatch in frequency will provide for very low displacement at the dam. The wave length of the vibratory motion will probably be in the 100 to 200 feet range. The maximum differential displacement of a few thousandths of an inch would probably occur over a distance of 25 to 50 feet; an inconsequential level of strain.

7. The vibratory ground motion limits adopted for the dam, pump station and residences are very conservative and well below recognized damage threshold criteria.

8. Seismographic monitoring of construction excavation blasting will be performed to verify that vibratory ground motion at the dam and residences is below the prescribed limits. The seismographic monitoring will be performed for all blasting conducted at Scaled Distances of less than 400 feet/pound$^{\frac{1}{2}}$.

EXHIBITS

The following exhibits are attached and complete the blasting permit application plan.

Exhibit A: Slosson and Associates letter to Pacific Corporation. Subject: Sumary of Westlake Reservoir (LVMWD), dated June 19, 1980.

Exhibit B: David J. Leeds and Associates letter to Chair, Regional Planning Commision, Los Angeles County. Re: Seismic Studies Three Springs Property, dated June 18, 1980.

Exhibit C: Las Virgenes Municipal Water District letter to R. Dennis Delzeit City Engineer, City of Westlake Village. Subject: "Proposed Use of Blasting Near Westlake Dam For KLK Company's Development of Tract 42801," dated July 25, 1986.

LAS VIRGENES MUNICIPAL WATER DISTRICT
EST. 1958

4232 LAS VIRGENES ROAD
CALABASAS, CALIFORNIA 91302-1994
PHONE (818) 880-4110

July 25, 1986

Tract # 34835

Mr. R. Dennis Delzeit, City Engineer
City of Westlake Village
31844 West Village Center Road
Westlake Village, California 91361

Subject: Proposed Use of Blasting Near Westlake Dam For KLK Company's Development of Tract 42801

Dear Mr. Delzeit:

We have no objections to the use of blasting for development of the property near the toe of Westlake Dam as long as the earth vibrations are limited to the following maximum particle velocities:

2.0 inches per second in the foundation adjacent to any part of the dam embankment;

0.5 inches per second in the foundation adjacent to the pump station at the toe of the dam.

If permission is granted for this program we would like to receive information on any conditions required.

Very truly yours,

LAS VIRGENES
MUNICIPAL WATER DISTRICT

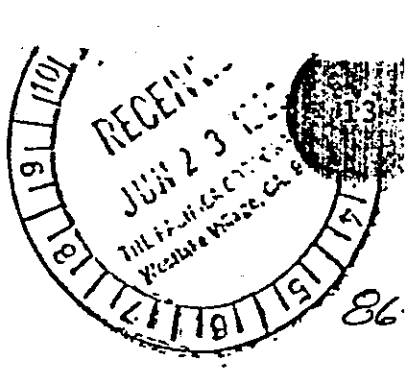
for H. W. Stokes
Chief Engineer

HWS:slc

cc: Bill Krim, KLK Development Company
John McCormick, Goffman & McCormick, Inc.
R. Stephenson, Division of Safety of Dams
Boyle Engineering Corporation, Inc.

SLOSSON AND ASSOCIATES
CONSULTING GEOLOGISTS
14046 OXNARD STREET
VAN NUYS, CALIFORNIA 91401

AREA CODE 213 787-4555 785-0835



June 19,1980

TO: Pacifica Corporation
31300 Via Colinas
Suite 104
Westlake, CA. 91362

SUBJECT: Summary of Westlake Reservoir (LVMWD)

Westlake Reservoir (Las Virgenes Reservoir) is one of the most modern dams constructed in the United States. The initial design concepts predated the 1971 San Fernando earthquake; however, even this design met the rather stringent requirements and regulation of the California Division of Safety of Dams. California did then, and still does, require the highest standards of all of the 50 states, as well as exceeding the design, construction, maintenance, and surveillance of those agencies of the Federal Government authorized to design and construct dams. The State Division of Safety of Dams, in conjunction with other State agencies, has caused Federal agencies, such as the Bureau of Reclamation and the Corps of Engineers, to redesign (in California) such dams as Auburn and Warm Springs.

I was appointed as a member of this Board of Consultants for Westlake Reservoir in April of 1969 as a replacement for a deceased member, (Russell C. Kenmir) of the Board. The Board's responsibility, by state law and professsional standards, was to provide assurance to the LVMWD and the State of California that:

1. the design met all safety standards and requirements;

2. that all work done by the consultants (Boyle Engineering, W.A. Wahler and Associates, etcetera) was done in a professional manner and met or exceeded standard practice;

3. that a good quality, realistic design was prepared;

4. that the contract specifications were correct, accurate, and complete;

5. that the contract bids were reasonable;

6. that all construction was done in a professional manner and complied with design specifications and State and Federal regulations.

EXHIBIT A

During my tenure on the Board of Consultants (from appointment in April of 1969 to completion of the Board's assignment in May of 1972), the Board of Consultants took a series of actions that caused improvements in professional procedures, design specifications, and earthquake safety (seismic design). These improvements were deemed necessary by members of the Board of Consultants to assure that blunders such as those that plagued other dams such as Saint Francis Dam, Baldwin Hills Dam, and even the Teton Dam would not occur. To prevent oversight of geologic data, or failure to involve the geologist in design and construction, the Board of Consultants took action that caused the licensed engineering geologist and soil engineer to be involved and to sign or certify that geologic and geotechnic data had been properly utilized and considered. In addition, these two fields of expertise were to review and approve the design specifications which involved their expertise.

In September of 1969, the Board of Consultants took action that caused the factors of safety for the various component units of the dam to be increased 30% ± over that required by the State of California and the Federal Government. This resolution brought about upgraded modifications and design parameters that excelled standard practice and government regulations. This action also required that W.A. Wahler and Associates:

1. do further exploration and analysis;

2. increase the data available for government review;

3. increase the data and supportive information for specifications issued to the bidding contractors;

4. increase the total geologic and geotechnic data base.

On February 9, 1971, Southern California was shaken by a 6.6 earthquake centered in the San Fernando area. This prompted the Board of Consultants to request that W.A. Wahler and Associates prepare a re-evaluation of the seismic design in light of:

1. the new data from the San Fernando earthquake;

2. the abundance of strong motion shaking records produced by the earthquake (such data was only sketchy from previous earthquakes);

3. the need to reassess the seismic environs of the general area (this to include a cataloging of active and potentially active faults, maximum magnitude that could possibly occur along these faults, ground shaking at the site from these earthquakes, and the behavioral patterns anticipated for the rock materials underlying the dam and reservoir).

In November of 1971, the Board of Consultants further requested that W.A. Wahler reanalyze the design utilizing at least a psuedo-static method. This was done and the last version of the design did meet or exceed the requirement by a factor of safety in excess of that required by the State and Federal Government by at least 30%. The newly acquired geologic, geotechnic, and seismic data were utilized in these analyses. The W.A. Wahler and Associates' report was entitled "Westlake Dam Stability, With Regard to the San Fernando Earthquake of February 9, 1971", dated May, 1972. Seismic coefficient equivalents of .10g, .15g, .20g, and .30g were in the analyses.

The faults which could affect the general vicinity and produce the strongest and/or strongest-longest shaking were considered. These were the:

1. Malibu Coast Fault, 8 miles distant;
2. Santa Susanna Fault, 15 miles distant;
3. Newport Inglewood Fault, 40 miles distant;
4. San Fernando Fault, 31 miles distant;
5. San Andreas Fault, 40 miles distant.

In reviewing the capability of Westlake Dam to withstand the effects of earthquakes, the Board of Consultants considered the following favorable characteristics of the site and structure, all of which have been documented:

" (1) The highly competent foundations of massive and sound volcanic rock throughout for the structures, and the absence of detrimental geologic features which might affect the structures adversely by localized tectonic displacements, or otherwise.

(2) The strong rolled earth-rock shells of the embankments, which are not susceptible to appreciable loss of strength under reversing cyclic loading, and which would effectively minimize deformations induced by earthquake shaking.

(3) The favorable properties of the core materials, affording adequate plasticity for avoiding formation of cracks.

(4) The conservatively designed and carefully sonctructed filter and drain zones, which protect the core against seepage-induced migration of earth particles, and which isolate the downstream shell zones against intrusion of seepage flow, both under normal operating conditions

and in the event of any reasonably expectable deformations resulting from an earthquake.

(5) The exceptionally favorable configuration of the main embankment, which is buttressed downstream and upstream near its midpoint by prominent mounds in the rock formations, affording significant restraints to the embankment not taken into account in the conventional two-dimensional analysis of stability.

The conclusions by Wahler and Associates that the most critical potential earthquake would be one with magnitude 8 originating on the San Andreas fault, which might produce horizontal accelerations up to about 0.25g in the vicinity of Westlake Reservoir, with shaking of this order of intensity lasting about 40 seconds, are in reasonable accord with the findings of other qualified investigators. "

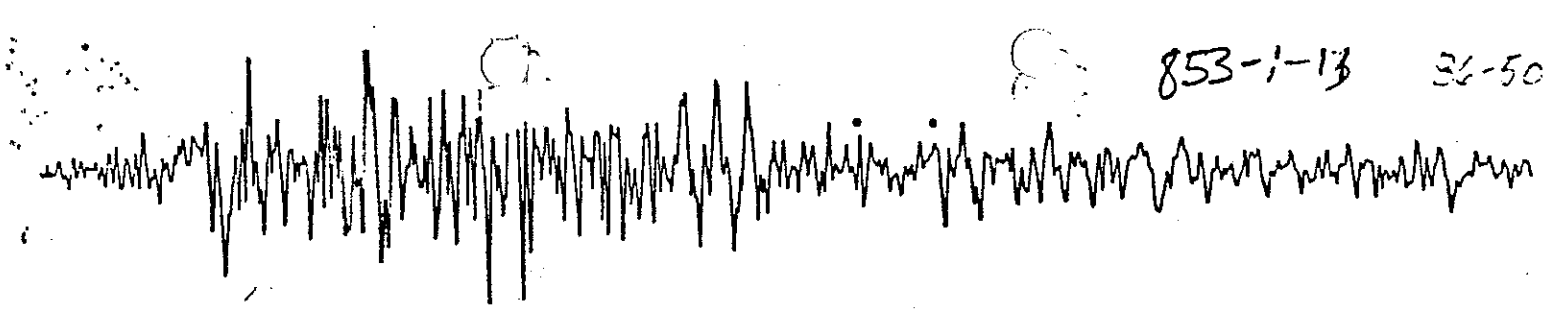
Robert A. Skinner, chairman of the Board of Consultants concluded, "Westlake Dam, because of unusually favorable overall characteristics of structural integrity and its relatively moderate seismic exposure, must be accorded preferred rank among earth and earth-rock dams in the sequence of comparative dependability as to stability".

Samples of the materials placed (compacted) during construction of Westlake Dam were tested by W.A. Wahler and Associates. These tests indicated that the materials, as placed, possess greater strength than the preliminary (pre-contruction) test suggested. W.A. Wahler concluded that the seismic safety of the dam was enhanced by these greater strength values. This assumption is valid. Thus, the final factors of safety should exceed those required by the Board of Consultants.

To the best of my knowledge, only a few dams exceed Westlake Reservoir in seismic safety. Among these are the new Los Angeles Reservoir (the modern replacement for the Van Norman Dam) and the Warm Springs Dam, which is presently under construction in Northern California.

James E. Slosson, Ph.D.
Member of Board of Consultants,
1961-1972
RG 46, CEG 22, GP 829

JES:lm



853-1-13 34-50

DAVID J. LEEDS AND ASSOCIATES

Consultants in Engineering Seismology/Geology/Geophysics

11972 Chalon Road
Los Angeles, CA 90049
(213) 472-0282

18 June 1980

Chair, Regional Planning Commission
Los Angeles County
320 West Temple
Los Angeles, CA 90012

Seismic Studies
Three Springs Property
Tentative Tract 34835
Westlake Village Area

Dear Commissioners:

This letter addresses potential ground motion/vibration/seismic problems that may be associated with development of a housing tract in the Westlake Village Area, known as Tentative Tract 34835. Three specific sources of ground vibration must be considered, along with the damage mitigation steps possible for each:

A. Earthquake
B. Blasting
C. Construction equipment

A. EARTHQUAKE

The Westlake Village Area is earthquake-prone, as is much of Southern California. It is located 42 miles from the San Andreas Fault, 7 miles north of the Malibu Coast Fault, and approximately 20 miles from the San Fernando Fault. The San Andreas Fault poses the greatest threat, with seismic ground motion at the site calculated on the order of 0.25g, with a bracketed duration of 40 seconds. The activity of the San Andreas and its potential for energy release in the foreseeable future make it a more important design consideration than the less active, though closer, Malibu Coast Fault. Activity on the Malibu Coast Fault or the more distant Zuma Thrust Fault has not been demonstrated in the past 11,000 years. While closer than the San Andreas, the San Fernando Fault Systems do not have the capacity to generate destructive motions at moderate distances. In fact, the area experienced only moderate shaking during the 1971 San Fernando Earthquake.

EXHIBIT B

Modern building codes have been developed, particularly for single-family residences that, if followed, mitigate against hazard to life or serious damage to structures. A moderate amount of cosmetic damage may still be expected. Modern California code construction has been demonstrated to be earthquake-safe. Code compliance should provide this same level of safety to the proposed project.

Obviously, any earthquake that shakes the Westlake Village Area is also going to shake the Las Virgenes Municipal Water District's Westlake Dam and Reservoir. The possibility of seismic damage to this dam is extremely remote, however, for several reasons. It was built to modern specifications about 12 years ago and to adequate standards. Postconstruction evaluation indicated that it surpassed design calculations. It was designed and built under the review of a "blue ribbon" panel of experts and is under the aegis of the California State Division of Safety of Dams. Furthermore, it had a partial test of its strength in the 1971 San Fernando Earthquake. With proper maintenance, there should be no seismic problems with this dam.

As a further comforting thought, there has been no seismic breach of a California dam since failure of the Sheffield Dam in the 1925 Santa Barbara Earthquake, and there has been no seismic damage to a modern rolled-earth, earth-fill, or rock-fill dam. The California dams that have had problems or near disasters have been hydraulic fill dams, a construction practice that has not been prevalent in California for over 40 years. Modern California dams have survived high intensity earthquake motion without damage. It is my firm belief that the Westlake Dam will survive earthquake and blast without damage.

B. BLASTING

A geotechnical report for the project indicates that some of the grading will require blasting. Some of the rock is too hard to move with bulldozers. Blasting is needed to break up the rock so that it can be handled. Concern has been expressed that the shock waves from this construction blasting might cause damage either to the dam or existing residences in the vicinity.

The technology and expertise exist to design blasting programs that do not cause damage. That is, the quantities of explosives used (for each shot) can be calculated so that the motion induced into the dam or other structures will be kept at a minimum, or undamaging levels. In addition, the program can be monitored instrumentally to measure the amount of ground motion at any given point. Together, the design of the blasting program and the monitoring (and continual redesign or control of blasting) can maintain a level of ground motion induced into the dam that is well below design levels and even below the level that it has already sustained in the 1971 San Fernando Earthquake.

C. CONSTRUCTION EQUIPMENT

The heavy equipment--bulldozers, compactors, vibrators, concrete mixers, cement handling equipment, and trucks--imparts energy into the ground. While

the actual ground motions produced by construction operations are measurable, damage is rare. It would be highly unlikely that construction vibration could damage Westlake Dam.

SUMMARY

1. A study is under way to define the seismic exposure of the area, stating levels of ground motion experienced in past earthquakes and forecasting the probable ground motions likely to be experienced in future earthquakes, along with the recurrence rate of the earthquakes. The information is already known but is being put into a format suitable for use in the design review process of new and existing properties. Present standards are considered adequate; however, an improved format of presentation is being developed. The work should be completed in time for submission with the tract map.

2. A blasting plan must be developed which spells out permissible loads and ground motion levels. This is also a County requirement that must be met before a permit is issued. It also provides for notification of owners of nearby structures and a monitoring program. The monitoring program should be planned to record the first large shots and all shots where ground motion levels approach design levels at critical locations. Not all shots need be monitored. Instrumental seismic monitoring can provide guidance for future shots in order to upgrade efficiency of the blasting and mitigate against damage.

3. A construction vibration plan can be devised to ensure that no large and continuous motions are imposed on critical facilities (the dam or residences).

Pertinent portions of the documents on the attached list have been reviewed in preparing this letter.

Respectfully submitted,

David J. Leeds
Certified Engineering Geologist #373
Registered Geophysicist #17

DJL:z

Enclosures:
1. Related documents list
2. Resume'

DOCUMENTS REVIEWED

Preliminary Evaluation of the San Fernando Earthquake of February 9, 1971 as it relates to Westlake Dam and Reservoir, to Las Virgenes Municipal Water District, April 1971, by W.A. Wahler & Associates (Project 01674).

Board of Consultants for Westlake Reservoir, Las Virgenes Municipal Water District, Concluding Statement. 7 pp. Draft. R.A. Skinner, February 1, 1973.

Review of Westlake Dam Stability With Regard to the San Fernando Earthquake of February 9, 1971, to Las Virgenes Municipal Water District, by W.A. Wahler, May 1972.

Geotechnical Investigation, Three Springs Property, Tentative Tract 34835 ..., by Gorian & Associates, 1978.

Draft Environmental Impact Report, Tentative Tract 34835, Zone Change Case 6454, Westlake Village Area, County of Los Angeles, March 12, 1980.

Site and Laboratory Investigation, Westlake Reservoir, to Las Virgenes Municipal Water District, by W.A. Wahler & Associates, September 1969.

Ibid. March 1970.

City of Thousand Oaks, Seismic Safety Element, Part 1, September 1974, F. Beach Leighton & Associates. (Building and Safety, City of Thousand Oaks, 401 West Hillcrest Drive, PO Box 1496, Thousand Oaks, CA 91360, 805/497-8611, Robert O'Brien, Director).

Seismic Hazards Study of Ventura County, California, CDMG OFR 76-5-LA, 1975. Includes: "Seismicity of Ventura County Region, California", by Roger W. Sherburne, pp 264-287.

LAS VIRGENES MUNICIPAL WATER DISTRICT
EST. 1958

4232 LAS VIRGENES ROAD
CALABASAS, CALIFORNIA 91302-1994
PHONE (818) 880-4110

July 25, 1986

Mr. R. Dennis Delzeit, City Engineer
City of Westlake Village
31844 West Village Center Road
Westlake Village, California 91361

Subject: Proposed Use of Blasting Near Westlake Dam For KLK Company's Development of Tract 42801

Dear Mr. Delzeit:

We have no objections to the use of blasting for development of the property near the toe of Westlake Dam as long as the earth vibrations are limited to the following maximum particle velocities:

2.0 inches per second in the foundation adjacent to any part of the dam embankment;

0.5 inches per second in the foundation adjacent to the pump station at the toe of the dam.

If permission is granted for this program we would like to receive information on any conditions required.

Very truly yours,

LAS VIRGENES
MUNICIPAL WATER DISTRICT

for H. W. Stokes
Chief Engineer

HWS:slc

cc: Bill Krim, KLK Development Company
John McCormick, Goffman & McCormick, Inc.
R. Stephenson, Division of Safety of Dams
Boyle Engineering Corporation, Inc.

EXHIBIT C

86-50