M/023/007

STEFFEN ROBERTSON AND KIRSTEN
Consulting Engineers

January 28, 1988
SRK Project No. 13701

RECEIVED
JAN 29 1988
DIVISION OF
OIL, GAS & MINING

State of Utah Natural Resources
Division of Oil, Gas and Mining
355 W. North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Attention: Mr. L. P. Braxton

RE: TINTIC PROJECT MINING AND RECLAMATION PLAN REVIEW COMMENTS

Dear Mr. Braxton,

Thank you for your review of the Notice of Intent (NOI) for the Tintic Project. Listed below are our responses to your questions and concerns addressed in your letter dated December 14, 1987.

Item 1 - Culvert and Diversion Ditch Sizing

The haul road culverts were sized to pass runoff from the 2-yr, 24-hr storm event. The culverts will be 12-inch diameter CMP. The haul road over the culverts will be graded to allow runoff from larger storm events to pass over the road and still remain within the existing drainage channel.

The diversion ditches were sized to pass runoff from the 100-yr, 24-hr design storm event and maintain about one ft of dry freeboard.

Calculations for the culvert and diversion ditch sizing are presented in the attachments.

Item 2 - Watershed Area

The attached figure delineates the catchment area affecting the project site.

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3232 South Vance Street, Suite 210, Lakewood, Colorado 80227, U.S.A.
Tel. (303) 985-1333 Telex 383599 SRK USA Facsimile (303) 985-9947
Other offices in: U.S.A., Canada, United Kingdom and Africa

Item 3 - Diversion Ditches

The diversion ditches will be rerouted to terminate in the existing natural channels adjacent to the north and south sides of the leach pad. The drawings will be changed to show the new alignments for construction.

Sincerely,

STEFFEN ROBERTSON AND KIRSTEN
(COLORADO) INC.

Don A. Poulter, P.E.
Project Engineer

Phillip De Dycker
Project Manager

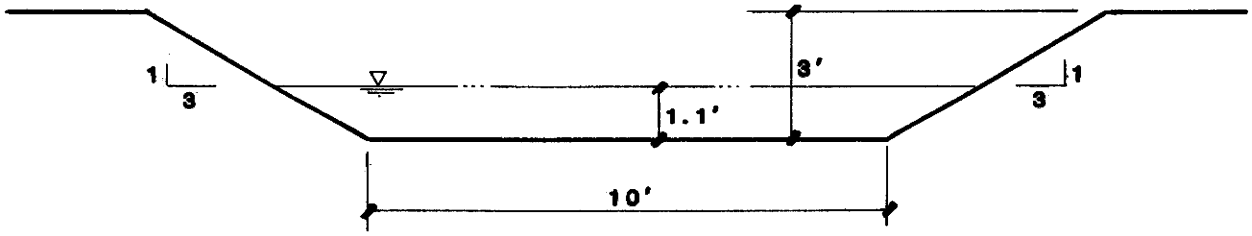
MR/gg

Attachments

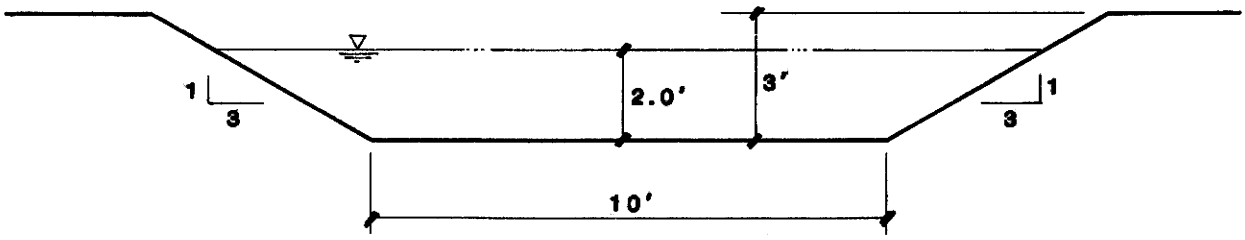
TABLE 1

DIVERSION DITCH CHARACTERISTICS

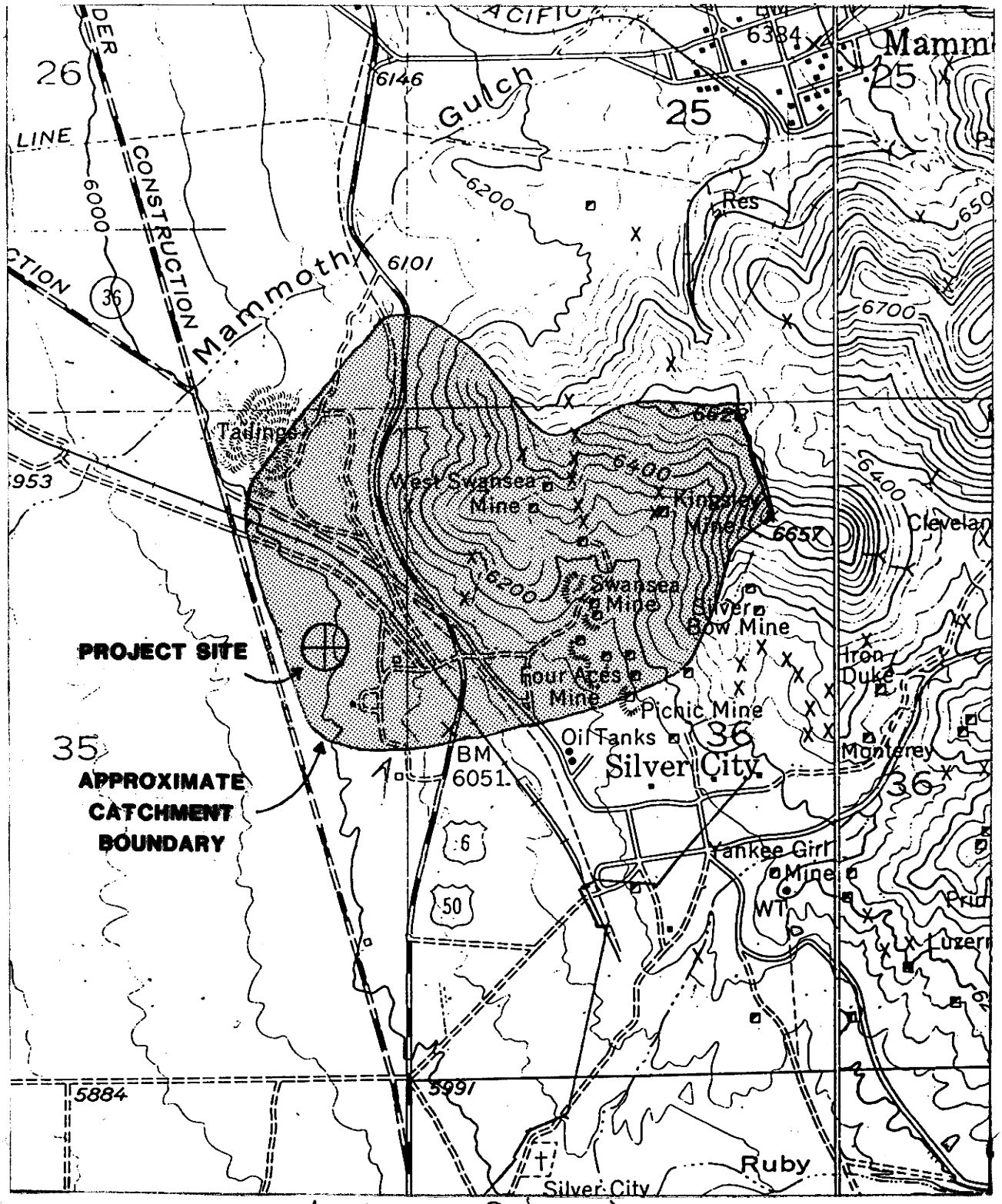
FLOW RATE (cfs)	BOTTOM SLOPE (%)	SIDE SLOPES (Horiz:Vert)	BOTTOM WIDTH (ft)	MANNING'S "n"	FLOW DEPTH (ft)	AVERAGE VELOCITY (ft/sec)
110	5.0	3:1	10	.04	1.1	7.5
110	0.5	3:1	10	.04	2.0	3.3



TYPICAL DITCH SECTION FOR 5% SLOPE



TYPICAL DITCH SECTION FOR 0.5% SLOPE



WAY OVER ESTIMATED THE AREA

HIGHWAY PROVIDES EFFECTIVE DRAINAGE CONTROL

PROJECT No. 13701	STEFFEN ROBERTSON & KIRSTEN Consulting Engineers	TINTIC PROJECT CATCHMENT AREA
DATE 1/88		
REVISION 0		

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        ******************************************************
        *                                                    *
        *     H Y D R O L O G I C A L   S Y S T E M S        *
        *                                                    *
        ******************************************************
        *                                                    *
        *           PROGRAM   -   WASHED                     *
        *                                                    *
        *           WATERSHED MODELLING                      *
        *                                                    *
        *       PROGRAM TO DETERMINE RUNOFF HYDROGRAPHS      *
        *       AND SEDIMENTGRAPHS FOR SMALL CATCHMENTS      *
        *                                                    *
        ******************************************************


        COMPANY DOING ANALYSIS :   SRK
        ENGINEER               :   MR
        DATE                   :   21-OCT-87
        CLIENT                 :   NORTH LILY MINING CO
        PROJECT DESCRIPTION    :   HEAP LEACH
        MAJOR WATERSHED NAME   :   TINTIC

        THE INPUT DATA FILE IS                  :13701.I
        THE FLOOD HYDROGRAPH AND SEDIMENTGRAPH IS NOT STORED

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        ***************************************************************
        WATERSHED CONDITIONS AT  TINTIC
        ***************************************************************

        GLOBAL PARAMETERS
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        RAINFALL                                    (mm.)    :     71.12
        INITIAL ABSTRACTION                         (mm.)    :       .00
          -- will default to the SCS method
        TIME INCREMENT OF HYDROGRAPH FROM START OF RUNOFF  :       .15

        RAINFALL DISTRIBUTION SELECTED                    :SCS TYPE 2 CURVE
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        ****************************************************************
        SUBWATERSHED CONDITIONS AT TINTIC 1
        ****************************************************************

        RAINFALL PARAMETERS
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        SCS CURVE NUMBER                            :  75.00
        UNIT HYDROGRAPH SELECTED                    :  DOUBLE TRIANGLE

        MAP PARAMETERS
        --------------

        AREA                                (ha.)   :     85.50
        HYDRAULIC LENGTH                     (m.)   :   1220.00
        PERCENT FOREST                        (%)   :     10.00
        PERCENT AGRICULTURE                   (%)   :       .00
        PERCENT GRASSLAND                     (%)   :     45.00
        OVERLAND FLOW SLOPE                   (%)   :     12.00
        CHANNEL SLOPE                         (%)   :      1.00
        CHANNEL LENGTH FROM SUBWATERSHED     (m.)   :      1.00
        TYPE OF CHANNEL FROM SUBWATERSHED           :AN UNLINED CHANNEL
        CORRECTION FACTOR FOR IMPERVIOUS AREA       :      1.00
        CORRECTION FACTOR FOR CHANNEL IMPROVEMENTS  :      1.00
        AREAL REDUCTION FACTOR                      :      1.00



        SEDIMENT PARAMETERS
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        THERE IS NO SEDIMENT DATA FOR THIS SUBWATERSHED

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********** STORM HYDROGRAPH GENERATED FROM START OF RAINFALL **********

TIME *	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
1.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
3.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
6.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
7.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
8.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
10.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11.0 *	.0	.0	.0	.0	.0	.0	.1	.2	.5	1.1
12.0 *	2.1	3.0	3.0	2.0	1.4	1.3	1.3	1.2	1.2	1.2
13.0 *	1.1	1.1	1.0	1.0	.9	.9	.8	.8	.7	.7
14.0 *	.6	.6	.5	.5	.4	.4	.4	.4	.4	.3
15.0 *	.3	.3	.3	.3	.3	.3	.3	.3	.3	.3
16.0 *	.3	.3	.3	.3	.3	.2	.2	.2	.2	.2
17.0 *	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
18.0 *	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
19.0 *	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
20.0 *	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
21.0 *	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
22.0 *	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
23.0 *	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
24.0 *	.1	.1	.1	.0	.0	.0	.0	.0	.0	.0

INITIAL ABSTRACTION	=	16.93	mm.
ROUTED FLOW TIME FROM THE SUBWATERSHED	=	.00	hours.
TIME TO PEAK OF UNIT HYDROGRAPH	=	.20	hours.
THE DEPTH OF WATER ON WATERSHED	=	21.14	mm.
VOLUME OF RUNOFF	=	18.07	thousand cu.m.
PEAK RUNOFF RATE	=	3.13	cu. m./sec.
TIME TO PEAK RUNOFF	=	12.15	hours.

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THERE IS NO SEDIMENT CONTAINED IN THE STORM RUNOFF FROM THIS WATERSHED

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STORM HYDROGRAPH FOR WATERSHED TINTIC

TOTAL AREA OF THE WATERSHED	=	85.50	ha.
THE DEPTH OF WATER ON WATERSHED	=	21.14	mm.
VOLUME OF RUNOFF	=	18.07	thousand cu.m.
PEAK RUNOFF RATE	=	3.13	cu. m./sec.
TIME TO PEAK RUNOFF	=	12.15	hours.
TIME INCREMENT OF NEW HYDROGRAPH	=	.15	hours.
NUMBER OF RUNOFF VALUES	=	92	

******* STORM HYDROGRAPH GENERATED FROM START OF RUNOFF *******

.0	.0	.1	.2	.8	2.1	3.1	2.0	1.3	1.3
1.2	1.2	1.1	1.0	1.0	.9	.8	.7	.6	.6
.5	.4	.4	.4	.3	.3	.3	.3	.3	.3
.3	.3	.3	.3	.3	.2	.2	.2	.2	.2
.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
.2	.2	.2	.2	.2	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1	.0	.0	.0
.0	.0								

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*****************************************************
*                                                   *
*     H Y D R O L O G I C A L   S Y S T E M S       *
*                                                   *
*****************************************************
*                                                   *
*           PROGRAM   -   WASHED                    *
*                                                   *
*           WATERSHED MODELLING                     *
*                                                   *
*       PROGRAM TO DETERMINE RUNOFF HYDROGRAPHS     *
*       AND SEDIMENTGRAPHS FOR SMALL CATCHMENTS     *
*                                                   *
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COMPANY DOING ANALYSIS :   SRK
ENGINEER               :   MR
DATE                   :   21-OCT-87
CLIENT                 :   NORTH LILY MINING CO
PROJECT DESCRIPTION    :   CULVERT SIZING
MAJOR WATERSHED NAME   :   TINTIC

THE INPUT DATA FILE IS                  :TINTIC.IN
THE FLOOD HYDROGRAPH AND SEDIMENTGRAPH IS NOT STORED
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        ***************************************************************
        WATERSHED CONDITIONS AT  TINTIC
        ***************************************************************

        GLOBAL PARAMETERS
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        RAINFALL                                    (mm.)    :     30.48
        INITIAL ABSTRACTION                         (mm.)    :       .00
          -- will default to the SCS method
        TIME INCREMENT OF HYDROGRAPH FROM START OF RUNOFF  :       .15

        RAINFALL DISTRIBUTION SELECTED                  :SCS TYPE 2 CURVE
==================================================================

        ****************************************************************
        SUBWATERSHED CONDITIONS AT TINTIC1
        ****************************************************************

        RAINFALL PARAMETERS
        -------------------

        SCS CURVE NUMBER                            :  75.00
        UNIT HYDROGRAPH SELECTED                    :  DOUBLE TRIANGLE

        MAP PARAMETERS
        --------------

        AREA                                (ha.)   :     85.50
        HYDRAULIC LENGTH                     (m.)   :   1220.00
        PERCENT FOREST                        (%)   :     10.00
        PERCENT AGRICULTURE                   (%)   :       .00
        PERCENT GRASSLAND                     (%)   :     45.00
        OVERLAND FLOW SLOPE                   (%)   :     12.00
        CHANNEL SLOPE                         (%)   :      1.00
        CHANNEL LENGTH FROM SUBWATERSHED      (m.)  :      1.00
        TYPE OF CHANNEL FROM SUBWATERSHED           :  A NATURAL STREAM
        CORRECTION FACTOR FOR IMPERVIOUS AREA       :      1.00
        CORRECTION FACTOR FOR CHANNEL IMPROVEMENTS  :      1.00
        AREAL REDUCTION FACTOR                      :      1.00



        SEDIMENT PARAMETERS
        -------------------

        THERE IS NO SEDIMENT DATA FOR THIS SUBWATERSHED

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********** STORM HYDROGRAPH GENERATED FROM START OF RAINFALL **********

TIME *	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
1.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
3.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
5.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
6.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
7.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
8.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
9.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
10.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
11.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12.0 *	.0	.0	.1	.1	.1	.1	.1	.1	.1	.1
13.0 *	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
14.0 *	.1	.1	.1	.1	.1	.1	.0	.0	.0	.0
15.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
16.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
17.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23.0 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24.0 *	.0	.0								

INITIAL ABSTRACTION	=	16.93	mm.
ROUTED FLOW TIME FROM THE SUBWATERSHED	=	.00	hours.
TIME TO PEAK OF UNIT HYDROGRAPH	=	.20	hours.
THE DEPTH OF WATER ON WATERSHED	=	1.87	mm.
VOLUME OF RUNOFF	=	1.60	thousand cu.m.
PEAK RUNOFF RATE	=	.07	cu. m./sec.
TIME TO PEAK RUNOFF	=	13.75	hours.

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THERE IS NO SEDIMENT CONTAINED IN THE STORM RUNOFF FROM THIS WATERSHED

==========

STORM HYDROGRAPH FOR WATERSHED TINTIC

TOTAL AREA OF THE WATERSHED	=	85.50	ha.
THE DEPTH OF WATER ON WATERSHED	=	1.87	mm.
VOLUME OF RUNOFF	=	1.60	thousand cu.m.
PEAK RUNOFF RATE	=	.07	cu. m./sec.
TIME TO PEAK RUNOFF	=	13.75	hours.
TIME INCREMENT OF NEW HYDROGRAPH	=	.15	hours.
NUMBER OF RUNOFF VALUES	=	81	

******* STORM HYDROGRAPH GENERATED FROM START OF RUNOFF *******

.0	.1	.1	.1	.1	.1	.1	.1	.1	.1
.1	.1	.1	.1	.1	.1	.1	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
.0									