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Volume 3 ; Book 6 0045

TOMBSTONE

Mining District

Cochise County

ARIZONA

Project 418, Barrel Tests and Heap Leaching Results/Assays - 1979

Progress Reports and Commun.

Consultants in:
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• coal • geothermal • environment
• remote sensing • color aerial photography
• interpretation-image processing
Worldwide Mobilization

2-20-79

file
P-418

4500 E. Speedway, Suite 14
Tucson, Arizona 85712
(602) 795-6097

James A. Briscoe, President
Registered Professional
Geologist

Southwestern Exploration Associates, Inc.

TUNGSTEN HEAP LEACHING

Recent innovations made in the field of hydrometallurgy by Southwest Exploration Associates, Inc. Hydrometallurgy have made feasible the recovery of tungsten and related minerals by low-cost, high-recovery heap leaching technology. The economic significance is that tungsten ores up to 1/10th the grade required for milling can be economically heap leached, resulting in drastically changed tungsten economics.

One of the greatest expenditures in processing tungsten ores has been the capital investment for a conventional milling and recovery operation. Now, heap leaching can be done for a fraction of the capital investment and can be utilized to solve metallurgical problems milling could not cope with, resulting in a more valuable end product. In addition, a tungsten heap leaching facility can be designed and constructed in months, while conventional milling and recovery plants take years to complete.

Ore types that can be treated are open pit, high-grade underground, dumps and tailings.

Associated Minerals

Some of the common ore minerals associated with tungsten minerals that can be heap leached and recovered, if economic, with the tungsten minerals are:

1. Gold
2. Silver
3. Molybdenum
4. Rhenium
5. Antimony
6. Bismuth
7. Arsenic
8. Phosphorus
9. Lead
10. Zinc
11. Colbalt
12. Tin
13. Mercury

Economics

Numerous underground tungsten mines have grades of about 1% WO_3, which is the average grade required for conventional milling and recovery plants.

Tungsten, (WO_3) has been selling for $120/S.T.U., which means that tungsten is sold (or priced) as tungsten (W) oxide (O_3), and the compound WO_3 sells for $120 per short ton unit, which is 20 pounds or at $120/20; WO_3 is worth $6/Lb. Following is the gross tungsten value per ton of ore for various tungsten average grades:

Average Grades	Gross Value/Ton Ore
1% WO_3	$120
.75% WO_3	90
.50% WO_3	60
.25% WO_3	30
.10% WO_3	12
.05% WO_3	6

Heap leaching of ores can be done for under $5/ton ore without any waste removal (stripping). Therefore, for tungsten ores without stripping requirements, an operation could make a small profit leaching tungsten ores that would average .05% WO_3, which is 1/20th of common "mill heads" of 1% WO_3. Also, much larger tonnages are made economic by heap leaching due to the much lower economic cut-off grade. In addition to the lower unit cost, a much higher production rate is possible compared to conventional milling.

The above can be summarized as follows:

1. Heap leaching results in a four (4) fold increase in annual cash flow.

2. Heap leaching results in a six (6) fold increase in present worth of the net operating profit.

3. The present worth obtained by heap leaching is not as sensitive to operating costs or percent recovery as milling.

The above illustrations follow:

RECEIVED MAR 14 1979

HAMILTON ASSOCIATES & CO.
680 FIFTH AVENUE • NEW YORK 10019 • 247-6421

March 8, 1979

Mr. James Briscoe
Southwestern Exploration Associates
4500 E. Speedway
Tucson, Arizona 85712

Dear Jim:

May I thank you for the time you gave Jim Aspell and myself when I was recently in Tucson, and for the long and gracious luncheon you hosted. It was much appreciated.

For the sake of clarity, I would like to recap the eight things we discussed:

EXPLORATION

I promised you to discuss with Dwight Lee, Southwestern's plan for mapping and pinpointing large ore bodies in the Western states. As I mentioned, this is primarily Dwight's province, but I do have two tax shelter firms who might be interested and I will bring these firms and Dwight Lee together.

DICK HEWLETT AND HIS LEACHING PROCESS

Hewlett, who is a new associate in your firm, has developed a leaching process and, according to my understanding, he is in the process of installing such a process in Tombstone, Arizona. From what I gathered, there seemed to be several major features regarding this process:

(a) His recovery of metals is equivalent to a smelting process.

(b) Dependent, of course, on any recalcitrant types of rock or ore, the chemicals he uses are not prohibitive in cost and would therefore be comparative to an average shipping and smelting cost.

(c) Because of his studies, he has done an extraordinary amount of work with carbon, and feels that his process is peculiarly adapted to the recovery of gold and silver.

(d) The cost of setting up leaching beds is much less than the cost of the erection of a comparative ball mill.

P418

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THE MAHALLA PROCESS

The Mahalla Process is a patented process in the United States and 40 foreign countries, not only for the recovery of copper but also for other non ferrous metals. It works on the principle of an exchange of ions. I am a member of the small syndicate that controls this process via an exclusive license with the inventor, Shalom Mahalla.

I asked Jim Aspell to hand-deliver to you and Hewlett an envelope which contained (a) the Mahalla patent; (b) the Battelle report on this process; and (c) a report from the State University of Arizona for Hecla Mining.

From a very brief preliminary discussion regarding Hewlett's leaching process, it would seem that the Mahalla Process would be a natural adjunct. With your permission, I asked Hewlett to look at this material and call me in New York to see if he agrees that there is a match. But even if this match does not exist, I am extremely interested in Southwestern knowing about the Mahalla Process, and, in the event they find any other application, I would be most pleased to discuss compensation for your firm.

A POSSIBLE LABORATORY IN TUCSON AND/OR JOINT VENTURE

In the event that there was a fit between Mahalla and Hewlett, it was mutually discussed that somewhere down the road it might be advantageous to set up some type of either joint venture or other capital structure which would lead to a permanent laboratory in Tucson. It would be the job of this laboratory to evaluate ores from small mining complexes both here and abroad to see if the Hewlett process with the Mahalla Process was a relatively inexpensive method to produce cements and/or pure crystals of non ferrous metals.

THE STEEPLE ROCK DISTRICT

I reported to you that Jim Aspell and I were the owners of a mine in the Steeple Rock district called the Laura. This mine is presently in production. Ore from this mine is being shipped to the El Paso Smelter. It is being contract mined by the Hansons.

Charles Hanson and his son, Douglas, both of whom are known to Hewlett, have been operating in this district for a number of years. They opened up two old mines, the Center and the East Camp. They then interested Dresser Industries, Inc. in temporarily taking over these two mines. Dresser did a large quantity of Diamond drilling, especially at the Center mine, and according to the Hansons, blocked out approximately $18 million worth of gold and silver-bearing ores. Dresser's option ran out as of February 28th, and for reasons too lengthy to explain in this letter, they did not exercise the continuance. As a result, the Hansons now again control, and are operating, these two mines.

In addition, the Hansons almost twelve months ago made a deal for the Summit mine, and they have been shipping ore from this mine. They also personally own the Banks and the Prince mines on the same vein as the Summit.

THE STEEPLE ROCK DISTRICT (cont'd)

In other words, for the first time in the history of this entire district, ownership of 90% of the mines in this district is in the hands of a very small group.

The history of the Steeple Rock district is that most of the mining is shaft and the ore has a tendency to pocket. The result is that no mine, with the exception of the old Carlyle, was a consistent producer. The theory now in practice at the Steeple Rock district is that with a number of mines operating, a consistent cash flow via shipping to the smelter can be achieved.

When I was recently in Duncan, I discussed the feasibility of erecting a mill in this district, now that a mill could be fed from many sources.

Provided it meets with your approval, and with the approval of the Hansons, it was suggested that the Hansons furnish sample stock from all mines and that these be considered and analyzed by Hewlett with the idea of possibly installing a custom leaching operation for this entire district.

I would appreciate hearing from you, whether this idea has firmed in your mind, and whether you wish me to proceed in exploring this possibility.

TAX SHELTERING SMALL MINES

As I mentioned above, I am working with two firms that specialize in tax shelters. One of them is especially interested in gold/silver mines. One of the criteria is that a tax shelter candidate is not a prospect but rather an old mine of some type which can be pro-formed so that it shows a fairly strong prospect of being profitable. I suggest that if you were interested, I would send you papers outlining the tax shelter procedure that one of the firms used. If I correctly remember our conversation, you stated that in your stable there might be several old mining ventures which, with todays high price of gold and silver, might possibly be suitable prospects. Knowing one of the firms rather intimately, I can assure you that they have considerable sums of money held in escrow awaiting suitable tax shelter vehicles.

GOLDEN HILLSIDE

Golden Hillside is a property that I have recommended for tax sheltering. It does not completely fit the criteria that I have outlined above. In other words, it is still a prospect rather than a possibly viable mine. I have recommended it because adjacent to it is a large extrusion of black calcite which forms a dike and the ore shaft that was sunk did show considerable values. Also, the district has a successful history.

Provided we sign the necessary papers with the owners, we will, in all probability, want an additional geological opinion. During luncheon, I asked you the impossible question about what would be the ball park cost, and you answered me correctly that until I outlined what was wanted, it would be impossible for you to give me even a ball park figure. This matter was left that I would get in touch with you and outline what I wanted, and at that time, you would furnish me an estimate.

BLACK CALCITE

Hewlett asked for the sample of Black Calcite. I have asked Jim Aspell to deliver a sample to Hewlett. As you know, there is a large quantity of Black Calcite available throughout Arizona and New Mexico. The basic problem is that no one, as yet, has come up with an economical method of recovering the high values in gold and silver, and the very small amount of platinum that is usually available in all Black Calcite veins.

It is not my intention to ask Hewlett to study possible new methods of recovery, but I am sending the sample purely because he asked for it. As you know, if Hewlett or anyone else could solve the secret of Black Calcite, it would be like discovering the Kohinoor Diamond.

I will await your comments on all the above and in the event you need any immediate answers, Jim Aspell is my Arizona partner, and as such, is cognizant of everything I do in the West.

Again, my thanks for being so courteous and giving me so much of your time.

Sincerely,

HAMILTON ASSOCIATES & CO.

Michael

J.Michael Migel

JMM/hs

cc: James Aspell
Dwight Lee

REVIEWED

MAY 8, 1979

By J. B. Brown

TO: JAB

FROM: WES

DATE: May 6, 1979

RE: My trip to Tombstone on Wednesday, May 2, 1979, to inspect the heap leaching operation.

On May 2 I traveled to Tombstone, Arizona to see first-hand Dick Hewlett's heap leaching operation and to study its application to our uranium exploration program in New Mexico. However I was immediately struck with the inefficiency caused by the use of used equipment and the lack of proper supplies. I plainly saw several cases of excessive down time, delayed schedules and costly additional work that was due to non-functioning, used equipment and lack of proper supplies and equipment. In particular, scheduling of work that is of a consecutive nature is difficult, if not impossible, when one does not know if equipment is going to work when it is supposed to, or if one piece of equipment fails and this causes additional delays in the overall program. This was evident at Tombstone in the few hours that I was there where, for instance, the major expense for the day was delivery of a tanker trunk of sulphuric acid which had to be stored in a makeshift, unanticipated storage tank because the intended storage tank leaked and the sprinkler system was not yet in operation due to the use of salvaged, used pumps and plastic pipe. This situation reminded me of an expression a friend of mine used to use, "A dollar waiting on a dime." In the case at Tombstone, the lack of $20 worth of plumbing and electrical supplies disrupted the entire day's work for about seven people and resulted in schedule disruptions which will take several days to correct.

My recommendation is obvious. Enough money should be appropriated to the job in order to get it done with new equipment and plenty of the necessary supplies before the job is underway. It can easily be seen that, given the present situation, some minor mechanical problem could come up and prevent the entire project from being completed. In other words the project could become a complete failure based on the failure or inappropriate use of a piece of used equipment. Of course, much more likely is that the project will take twice as long to accomplish as need be, resulting in an overall greater cost than if new equipment and sufficient supplies were utilized in the first place.

WES

WES/kar
P-418

No. 967351

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NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO: R. F. Hewlett

STREET AND NO.: 121 E. 5th

P.O., STATE AND ZIP CODE: Tombstone, Ar.

POSTAGE				$ 1.5
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE			80¢
	OPTIONAL SERVICES	SPECIAL DELIVERY		¢
		RESTRICTED DELIVERY		¢
		RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	4.5¢
			SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
			SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
			SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES				$1.40

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PS Form 3800, Apr. 1976

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3. If you want a return receipt, write the certified-mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, afix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.
4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse RESTRICTED DELIVERY on the front of the article.
5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in Item 1 of Form 3811.
6. Save this receipt and present it if you make inquiry.

☆ GPO 1978 -256-915

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U.S.MAIL

RETURN TO

SOUTHWESTERN EXPLORATION ASSOCIATES,

(Name of Sender)

4500 E. SPEEDWAY, SUITE 14

(Street or P.O. Box)

TUCSON, ARIZONA 85712

(City, State, and ZIP Code)

PS Form 3811, Apr. 1977

RECEIVED JUN 26 1979

SENDER: Complete items 1, 2, and 3.
Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one).

- [x] Show to whom and date delivered ..... 75¢
- [ ] Show to whom, date, and address of delivery .. ____¢
- [ ] RESTRICTED DELIVERY
  Show to whom and date delivered ..... ____¢
- [ ] RESTRICTED DELIVERY.
  Show to whom, date, and address of delivery . $____

(CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:
R. F. Newlett
121 E. 5th
Tombstone Ariz. 85638

3. ARTICLE DESCRIPTION:

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	967351	

(Always obtain signature of addressee or agent)

I have received the article described above.
SIGNATURE ☐ Addressee ☒ Authorized agent
Margaret Newlett

DATE OF DELIVERY	POSTMARK
6-25-79	TOMBSTONE JUN 25 1979 USPO

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S INITIALS

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

☆ GPO : 1977—O-234-337

File: P-418

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(602) 795-6097

James A. Briscoe, President
Registered Professional
Geologist

Southwestern
Exploration Associates, Inc.

June 22, 1979

Mr. Richard F. Hewlett
Vice President
S.E.A. Hydromet, Inc.
Nellie Cashman Apts.
Cottage # 2
121 E. 5th
Tombstone, AZ 85638

Re: Tom Schloss, Dr. John Dean Visit - Evaluation of Progress - Setting of Objectives, Activities, and Record Keeping for the Next Week and Plans for the Future

Dear Dick,

Since yesterday afternoon, I have spent approximately eight (8) hours reviewing progress at Tombstone with Tom Schloss and metallurgical consultant John Dean. John was engaged by Tom to help us with what appear to be definite problem areas, but particularly because of unsatisfactory performance at Tombstone to date. Without going into a great deal of detail, we are at least four (4) weeks behind your projections, and 400% over budget.

Our original objectives of Tombstone were to expend in the range of $25,000 to make insitu tests of your metallurgical techniques, which you warranted would verify the techniques and put us into profitable production with a substantial cash flow. Up to this time, we have:

1. expended approximately $100,000,
2. changed metallurgical approaches several times with inadequate documentation, and
3. have not scientifically verified nor documented even the negative results, to my knowledge.

Obviously, it is imperative to do the following:

1. Pick one metallurgical test at a time and follow it through to completion, with careful documentation that can be corroborated by other engineering or metallurgical investigators -- negative as well as positive information to be reported in an unbiased manner.

2. Layout the goals and specific objectives of a meaningful, concise, and reproducible metallurgical program.

3. Layout a tight operating budget for such a testing program.

4. Determine a realistic timetable and action plan for the above.

If the above is carefully done and realistic, I am sure that I will be able to endorse it, and I feel that Tom will underwrite it, assuming John Dean's technical approval. Without such a careful re-evaluation and plan, I would have no option but to recommend termination of further work.

The above summarizes in only very brief outline form our problems to date and the intermediate term solutions to these problems. Of even more critical importance is what we do in the next seven (7) days. Tom, John Dean, and I have discussed this in great detail. It is absolutely imperative that you carry out, to the best of your ability, and in the highest professional manner, the following seven-day action plan to meet the stated objectives. I think it is obvious that the continuation of the program depends on this. I think it is also obvious that no changes should be made without documentation and verbal O.K. from Tom and/or myself.

The activities and objectives to be reached are as follows:

ACTIVITIES

1. a) as a maximum, construct the following:

Area #1 - 3 lifts
Area #2 - 2 lifts
Area #3 - 2 lifts

b) set up test leaches exactly like the USBM-Reno for 1) North slope dump "ore" and 2) Manganese dump "ore";

c) after completion of the above, terminate the dozer for the present;

d) prepare documented proposal of chemistry to be used and wait for approval.

2. a) do not work on any other pads until written notice from Tom or myself;

b) put Dusty in charge of heap. Have him do all physical work there during the day and have Ed Rice take over the night shift and report to Dusty. Dusty should report to you. You are not to take any physical part of the heap activities but only concern yourself with engineering work, i.e.:

1) chemistry-metallurgy
2) budget
3) engineering and quantification

3. Leach areas 1, 2, & 3.

4. Melt percipitates daily. Mail these to Tucson daily by return receipt requested mail.

5. Keep accurate, concise, records which can be checked by any independent professional. This should be done on a form or forms of your own design, to include, but not limited to, the following:

a) daily record of dimensions of dump under leach and tonnage calculated for that area, plus supporting data, measurements, etc.

b) record of through-put -- hours of leach per shift, down time, etc.

c) titrate return hypo solution to determine barren strength, and for presence of zinc.

d) determination of H_2O balance per shift; i.e. H_2O added to replace that lost to evaporation, absorption in dump, or loss through pad.

e) weigh out of zinc used per shift.

NOTE: Materials balance is the key.

6. W. Edward Speer will take sample of:

a) Emerald ore -- high MnO_2 ore from dump

b) North Ramp ore

7. Prepare a two (2) page memo specifying your opinion of the best option for leaching Mn ore.

8. Come up with a realistic budget for the above.

OBJECTIVES

1. Document silver production from a specific amount of heap ore, specifically from areas 1, 2, & 3, processed from 6/22/79 to 6/27/79.

2. Have documented budget for the above by the evening of 6/23/79.

3. Have test leach pads (as in Activities, #1b, sections 1 & 2) and an action plan with proper miner-like record keeping forms and budget by 6/26/79.

4. Have two (2) page "best options" report on metallurgy to use on Mn Ox ore by 6/26/79.

On or before the dates specified above, mail, by registered, return receipt requested mail, one copy of all paperwork required above to Tom Schloss in New York, one copy to John Dean in Rhode Island, and one copy to myself in Tucson. Also be prepared to discuss all of the material in concise, brief terms on the morning of June 27, 1979.

Dick, I do not expect to have to tell you the details of how to do and document your job. I do expect, at minimum, the above outlined documentation, but it should not be limited to the above. It is your responsibility to do what is necessary for documentation and you will be held accountable for any omissions.

Very truly yours,

Jim Briscoe

James A. Briscoe

JAB:cmd
P-418
cc: Tom Schloss
Dwight Lee
Dr. John Dean

P-418

RECEIVED JUL - 9 1979

FAMCO | 1700 Broadway • New York, New York 10019 • (212) 247-0420

REVIEWED
JUL 10 1979
By JB

Very good see review memo

TOMBSTONE EXPLORATION, INC.

2 Week Program

TO: Dick Hewlett
James Briscoe
John Dean

FROM: Tom Schloss

DATE: July 6th, 1979

OBJECTIVE: (Clear, Concise, Quantifiable)

1. Test metallurgy by leaching on test leach pad. Ore should be at value higher than break even cost.

2. Develop cash flow to finance # 3 by leaching ore from the heap on a larger scale.

3. Cash flow to finance
   (a) Drilling for ore control.
   (b) Drilling in open pit areas to improve for leach.

PROBLEM: (What factors stand in way of achieving objectives)

1. Inadequate knowledge and experience of metallurgy and ore types
2. Capital to develop efficient;
   (a) Drilling program feed control
   (b) Metallurgy

3. Time - causing disillusionment of capital.

SOLUTION I : (To achieve objectives)

Conserve cash to insure best number of chances of finding ore of sufficient quality to test plant operation and start cash flow.

IMPLEMENTATION:

Take known data and assign priorities to five target areas.

1. Fully describe for each target all of the characteristics and reason why chosen including ore types, screen analysis, AA results

IMPLEMENTATION: (contd.)

1. contd.

   quick cyanide analysis, estimate of amount of tonage, history and references.

(.5 day per target x 5=2.5 days)

2. "Mountain and Valley" each to 5' to 10'
3. Scrape each side with dozer and send in scrapper to pick up 100 tons.
4. In highest priority target area, split that heap in half and crush half.

(5 - 7 days)

5. Take sample for each of new 6 piles and send to Jacobs.

(Concurrent with # 4 per target take 2 to 3 days)

6. Test each leach area separately.
7. Use straight cyanide for each test as a control test unless John approves another type of test.
8. Analyize results to determine:
   (a) Cost for reagents.
   (b) Time to set up and process heap.
   (c) Best approach to crushing decision.
   (d) Type and size for plant.

RESULTS:

1. Five areas analyized with 100 tons each in a short time.
2. Knowledge of results in 48 hours after first "Mountain and Valley".
3. Ability to go back and dig holes with back hoe to quantify this quantity and quality of ore. (Implement Solution II).
4. Five chances to find ore.

COST:

1.	Scraper	No/Charge
2.	Dozer @ 6/hour for 2.5 days	$144.00
3.	Five large samples sent to Jacobs	$250.00
4.	Labor	

SOLUTION II:

Fully analyize one given area (East I).

2 days	1. Use back hoe to drill 4 to 10 holes.
5 days	2. Send assays to Jacobs for assaying.
2 - 3 days	3. Test heap leach ore from holes. May have to wait for results from Jacobs.

RESULTS:

1. Knowledge about one area.
2. Ability to extract information on this ore.
3. If results are poor then must start whole process over.
4. 10 Tons of ore per/hole x 4 to 10 holes = 40 ton to 1000 tons.

COST:

1.	Back Hoe	-	$400.00
2.	Man & Gas	-	$ 30.00
3.	Lab Fees	-	$200 - $500
4.	Labor	-	

Tom

THS/avc

RECEIVED JUL - 9 1979 P-418

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REVIEWED
JUL 10 1979
By JB

Very good see memo

TOMBSTONE EXPLORATION, INC.

2 Week Program

TO: Dick Hewlett
James Briscoe
John Dean

FROM: Tom Schloss

DATE: July 6th, 1979

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3. Cash flow to finance
   (a) Drilling for ore control.
   (b) Drilling in open pit areas to improve for leach.

PROBLEM: (What factors stand in way of achieving objectives)

1. Inadequate knowledge and experience of metallurgy and ore types
2. Capital to develop efficient;
   (a) Drilling program feed control
   (b) Metallurgy

3. Time - causing disillusionment of capital.

SOLUTION I : (To achieve objectives)

Conserve cash to insure best number of chances of finding ore of sufficient quality to test plant operation and start cash flow.

IMPLEMENTATION:

Take known data and assign priorities to five target areas.

1. Fully describe for each target all of the characteristics and reason why chosen including ore types, screen analysis, AA results

IMPLEMENTATION: (contd.)

1. contd.

   quick cyanide analysis, estimate of amount of tonage, history and references.

(.5 day per target x 5=2.5 days)

2. "Mountain and Valley" each to 5' to 10'
3. Scrape each side with dozer and send in scrapper to pick up 100 tons.
4. In highest priority target area, split that heap in half and crush half.

Where does it come from
Ans. 1st pile divided 1/2 + 4 piles

(5 - 7 days)

5. Take sample for each of new 6 piles and send to Jacobs.

(Concurrent with # 4 per target take 2 to 3 days)

6. Test each leach area separately.
7. Use straight cyanide for each test as a control test unless John approves another type of test.
8. Analyize results to determine:
   (a) Cost for reagents.
   (b) Time to set up and process heap.
   (c) Best approach to crushing decision.
   (d) Type and size for plant.

RESULTS:

1. Five areas analyized with 100 tons each in a short time.
2. Knowledge of results in 48 hours after first "Mountain and Valley".
3. Ability to go back and dig holes with back hoe to quantify this quantity and quality of ore. (Implement Solution II).
4. Five chances to find ore.

COST:

1.	Scraper	No/Charge
2.	Dozer @ 6/hour for 2.5 days	$144.00 — doesn't compute
3.	Five large samples sent to Jacobs	$250.00
4.	Labor	
		$ 394

SOLUTION II:

Fully analyize one given area (East I).

2 days	1. Use back hoe to drill 4 to 10 holes.
5 days	2. Send assays to Jacobs for assaying.
2 - 3 days	3. Test heap leach ore from holes. May have to wait for results from Jacobs.

RESULTS:

1. Knowledge about one area.
2. Ability to extract information on this ore.
3. If results are poor then must start whole process over.
4. 10 Tons of ore per/hole x 4 to 10 holes = 40 ton to 1000 tons.

COST:

1.	Back Hoe	-	$400.00
2.	Man & Gas	-	$ 30.00
3.	Lab Fees	-	$200 - $500
4.	Labor	-	

Tom

THS/avc

July 10th, 1979

Dear Mr. Hewlett
&
Dr. Dean

Tom has asked me to type up this report re:
Combined Progress Report and "Pilot Test" Design.

Would you kindly review and/or correct where needed. We have the original hand written copy on hand here at our office.

Thank you.

Sincerely,

Angie Cassidy

Angie Cassidy
Secretary to
Thomas H. Schloss
Chairman of the Board

MS/

Attch:

Yes, I'm sorry for yourself
I wish you
good luck
Sorry

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TOMBSTONE

TO: Tom Schloss, Dr. John Dean, James Briscoe
DATE: June 27th, 1979
FROM: Dick Hewlett
RE: COMBINED PROGRESS REPORT AND "PILOT TEST" DESIGN

TOMBSTONE PILOT LEACH

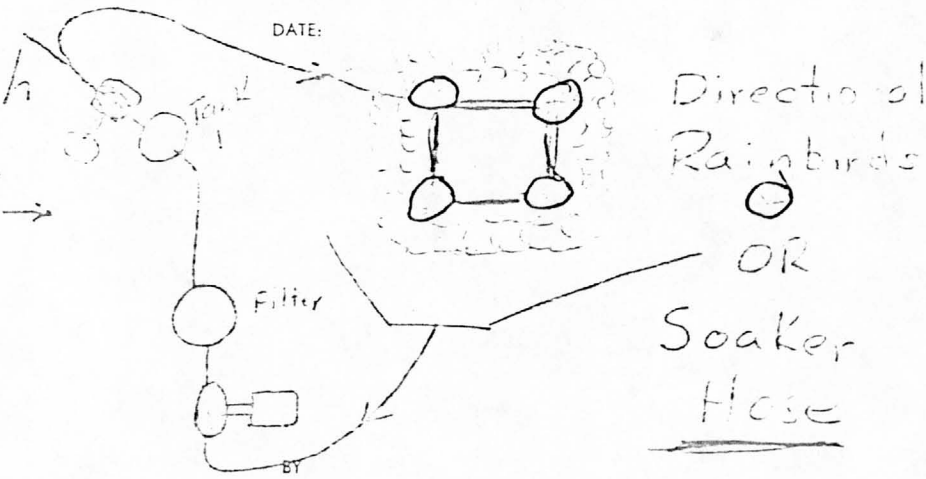
A pad and leaching area will be constructed on the north side of the heap, starting near the north ramp and extending north around the heap (see sketch A).

Activities required are:

1. Doze brush and prepare site.
2. "Grade" area to level and build in a drainage slope.
3. Haul tails on to site.
4. Level to 3-inch lift.
5. Water -saturate with water truck
6. Compact with loaded - loader
7. Repeat 3-6 until 4-3 inch lifts are layed down, leveled, saturated & compacted.

The above constructed in a manner such that in addition to provide an impermeable base for "pilot" leach tests, the pad will later be used for production without further construction.

The "pilot" leach will be as shown opposite →



Heap Pilot Tests:

Tonnage for each test to be "heaped" on each separate section of the pad will be 200 tons. This will occupy a square area of:

$$200 \quad T = \frac{L\ w\ h}{TF} = Lw \frac{(5 \text{ ft high})}{\text{Tonnage factor}}$$

$$18.5$$

$$200 \quad T = L\ w \frac{5}{18.5} \qquad Lw = 740 \text{ ft.}^2$$

$$\text{or } L{=}w{=} \quad 27 \text{ ft.}$$

Therefore, the area would be 30' x 30' and 5 foot high.

Pilot Spray Parameters:

Lift Height	Ore Mean Surface Area	Number Sprays	Tons Treated per Spray	Gal/min per Spray	Gal/Min per 100 ft^2
5'	740 ft^2	4	50	5	0.68

Flow Rates:

$$20 \quad 6PM = \frac{20 \ 6PM \ (60 \ M.P.Hr.)}{240 \ Gal/Ton} = 5 \ ton/hour$$

For Spray Mainfold for 20 6 PM

$$\text{Pipe size (Di)} = \frac{2.2 \ W^{0.45}}{\rho^{0.31}} \quad \Bigg\} \quad Di = 1.9 \text{ or } 2 \text{ inches}$$

Where Di = Pipe Diameter
W = Weight flow (thousand #'s mass/hr)
ρ = Fluid density = mass/ft^3

Solution Balance:

A. Water of saturation
10% of tonnage = 0.10 (200 T) = 20 tons

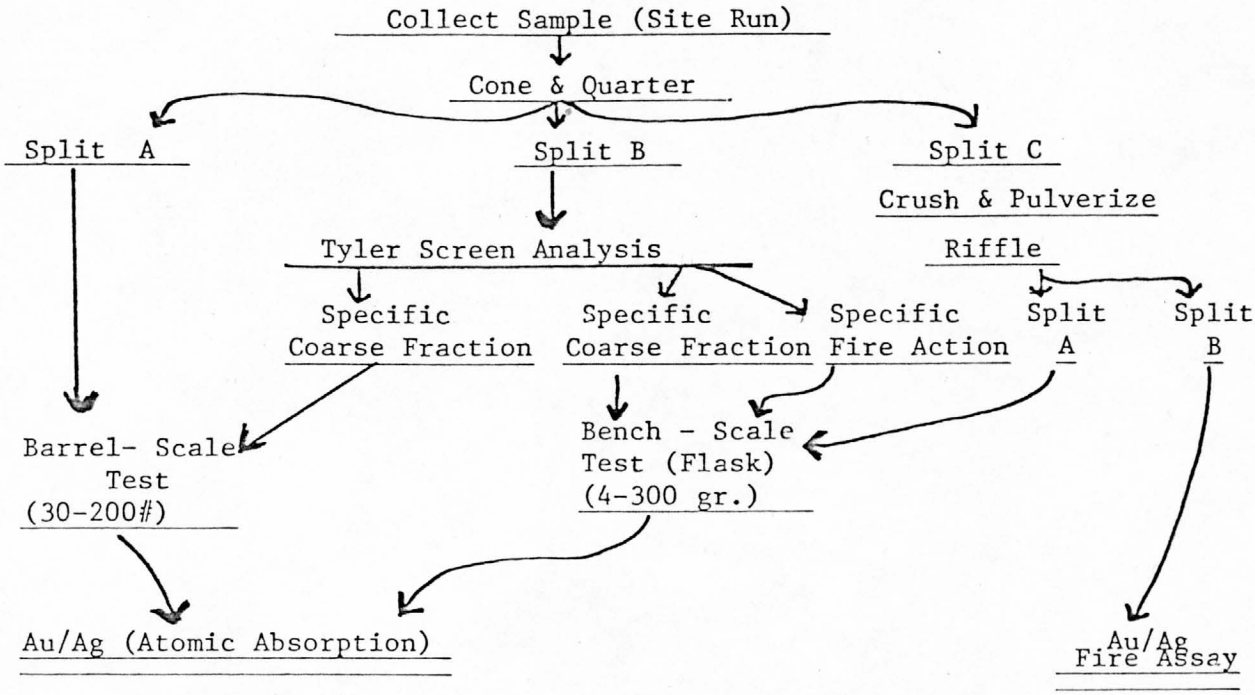
B. Period of total saturation

$$\frac{20 \ tons}{5 \ tons/hr} = 4 \ hours$$

C. Circulation Rate: 5 tons/hour

D. Evaporation: Very small because no pond will be used for circulation. (the pond will be used to test -evap. 9 decomposition of hypo, etc.

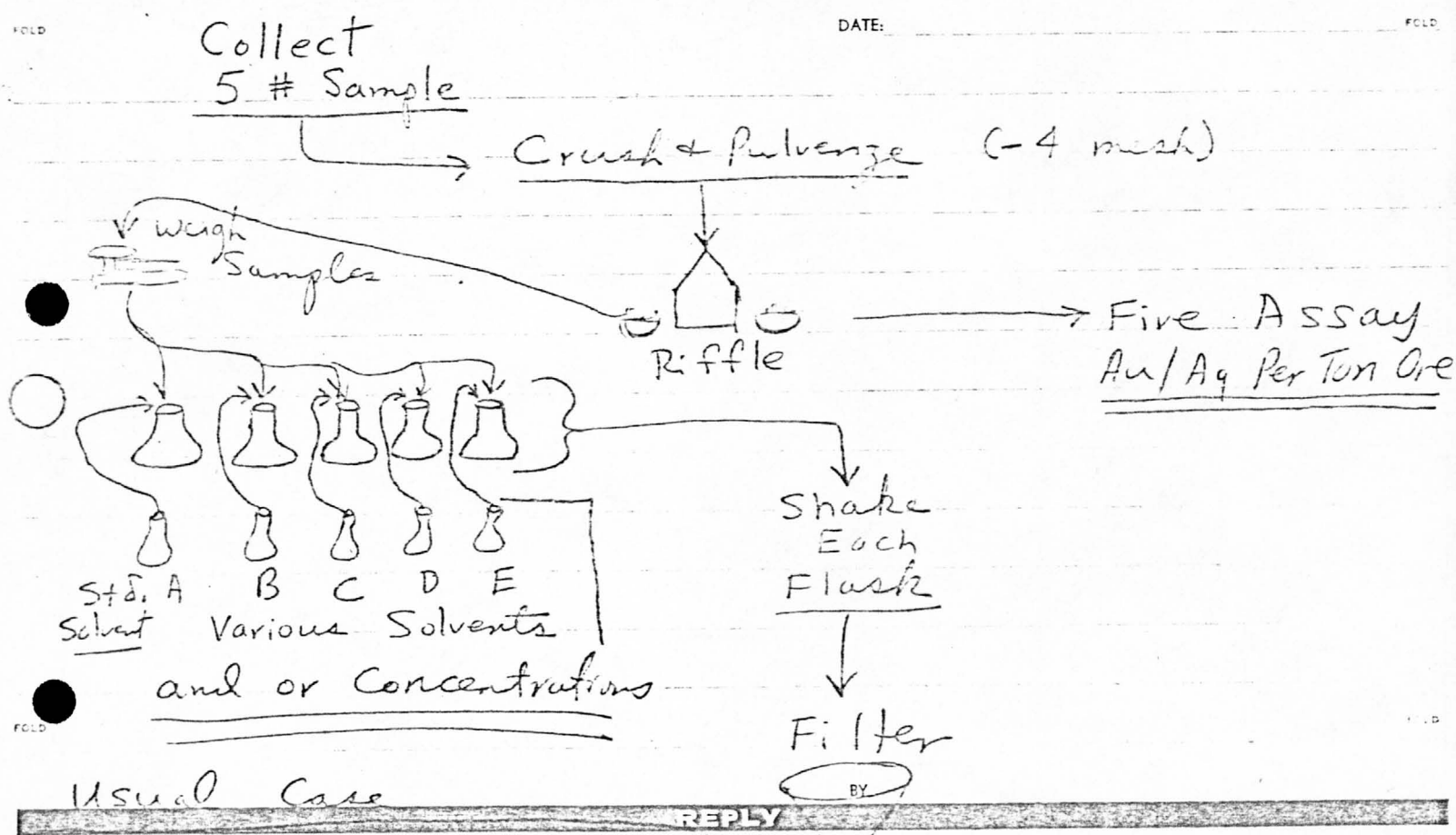
General Analysis Procedure:



DISCUSSION OF GENERAL ANALYSIS PROCEDURE:

A. Objective - Solvent Analysis & Economics

1. Collect 5 # sample → crush & pulverize.
2. Cone & quarter if other tests are to be made from this site.
3. Riffle to obtain desired sample sizes.
4. Send 1 # sample for fire assay (lab uses 1 assay ton ≅ 30 grams)
5. Weigh as many samples as there are solvent tests. I usually use 30 grams.
6. Label and charge each sample (30 grams) with solvents previously prepared. Save a blank solvent sample 50 ml.
7. Shake 8. filter
9. Determine Au & Ag concentration using atomic absorption



Usual Case

0 gr. Sample
90 ml. Solvent Solution
Shake 2 hours - Room Temp.

$$AA_{\text{reading}}\left(\frac{\text{t. oz.}}{\text{ton Soln}}\right)\left(\frac{90}{30}\right) = \frac{\text{t. g. Precious Metals}}{\text{Ton ore}}$$

ATOMIC ABSORPTION METHODS

Basic are:

1. Sample size (4 ⟶ 200 grams)
2. Sample Type: A. Screened ⟶ Fires
   B. Sample Run → Coarse & Fires
   C. Crushed & Pulverized
3. Sample Weight: Solution weight ratio

Procedure:

A. Weigh sample
B. Select solvent c. agitate (shaker)
C. Filter
D. Prepare filtrate for AA determination

Conversion of AA determination (t. oz./ton soln) to t. oz./ton ore:

$$\left[\begin{array}{c}\text{AA Determination}\\ \text{(t.oz./ton soln)}\end{array}\right] \qquad \left[\frac{\text{wgt. soln.}}{\text{wgt. ore}}\right] = \frac{\text{t. oz.}}{\text{ton ore}}$$

EXAMPLE:

$$\left[\text{AA}\right] \qquad \left[\frac{\text{90 ml = 90 gr. soln}}{\text{30 gr.}}\right] = \left[\text{AA}\right] \qquad \frac{90}{30} \text{ or } 3$$

Other Example: Larger Test

$$\frac{\text{300 ml soln}}{\text{30 gr. sample}} = \left[\text{AA}\right] \qquad \left[\frac{300}{30}\right] = \left[\text{AA}\right] \qquad 10 = \frac{\text{6 oz.}}{\text{Ton Ore}}$$

Atomic Absorption Interference Problems:

Effect of common elements on absorbance of Au resonance lines

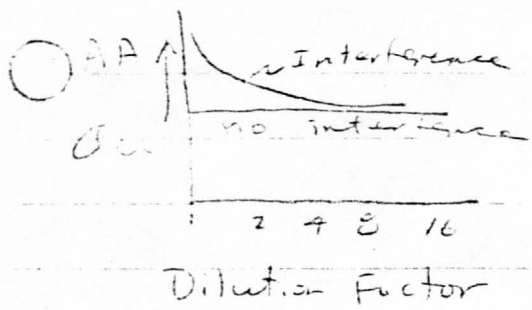
(Air- C_2 H_2

Solution	Au 242.8
1000 ppm K	.002
1000 ppm Na	.003
1000 ppm Al	.030
1000 ppm Mg	.002
1000 ppm Ca	.015
1000 ppm Fe	.017

Therefore, when aqua regia or other acid digests (as Hbr + Br_2) are used, various elements as mentioned above cause interference in the gold wave length yielding a false Au reading.

Interference Test: Gold wave length

Dilution



Dilute sample and compare calc. Au value with AA reading is higher than calculated and various interference.

Note: Yellow or colored flame indicates possible interfering element. Also blank of solvent solution indicates and quantifies interference except for intefering soluble elements as aqua regia and iron (acid soluble).

Example: Dilution Factor

	1	2	4	8	16	32	
AA	.21	.069	.033	.014	.00625	.003125	Interfer
(Au)	.10	.05	.025	.0125	.00625	.003125	No Interf.

200ml Sol. + Resin + Shake → Filter/Wash → 200 ml (¼ AR) → AA

Solve } by Load Au on Resin → Filter → Wash Residue → Elute with equal vol. ¼ Aqua Regia

Ferrous Sulphate
Source: McKesson - Tucson

50 # Bags

Bags	Price
4 - 9	$24.15/100 #
10 - 39	19.50/100 #
40 - 100	14.15/100 #
+ 100	12.65/100 #

Ferrous Chloride
Source: McKesson - Tucson
Chem West - Fontana, Calif.

Tank car = 50,000# = 25 tons
30% solution → $140/ton } anhydrous F.O.B. L.A.

10.478
#/Gal
50,000 #
↓
4772 Gal

Price Tankcar	
$1050	= $0.021/#
Total	$2,275

Freight LA-Tombstone(May Frt. Rate
$2.45/100 #
$1,225

$ .477/Gal T
.0455/# T 30%

Solvent/Reagent Prices

Na OCI (Sodium Hydpochlorite)

Source: Copper States -Tucson
14% Solutions -55 gal Drums

Quantity: 55 gal. Drums	Price:	Plus $30.00/Drum Deposit
1-5	.90/gal	14% Soln NaOCI
6-9	.85/gal	Sp. Gr. = 1.1365
10-14	.80/gal	Gr/ = 159.1
15+	.75/gal	#/Gal = 1.328
		[9.475 $\#^{T}/Gal$]

$Fe\ Cl_3$ Ferric Chloride

Source: McKesson- Tucson

55 Gal Drums	Drums 1-4	$9.50/100#

Be	Sp.Gr	$FeCl_3$	Gr/ℓ	$\#/FT^3$	[11.77^{T} #/Gal]
42.3	1.4118	44%	621.2	38.78	5.184 #/Gal.

ACID

Source: Apache Powder = St. David

NITRIC	SULFURIC
60% HNO_3	70% H_2SO_4
$150/100% Ton	$6/100% Ton

Average tanker wgt = 22 tons

60% HNO_3	= 6.843 #/Gal	70% H_2SO_4	= 9.408 #/Gal.
	= 1.3667 Sp. Gr.		= 1.6105 Sp/Gr.
	= 11.394 #/Gal		= 13.472 #/Gal.
	=175.5 Gal/Ton		= 148.96 Gal/Ton

22T (HNO_3)	= 3861 Gal.	22T (H_2SO_4)	= 3277.12 Gal.
22 (.60)	= 13.2 100% Tons	22 (.70)	= 15.4 100% Tons
(13.2) ($150/T)	= $1980	(15.4) ($6/Ton)	= 92.30
+ Freight	= 90	+ Freight	= 90

HNO_3 $ 2070	COST	H_2SO_4 $182.40
$94.09/Ton	Ton (dil.)	$8.29/Ton
.047/#	# (dil.)	.004/#
.078/# - 100%	# (undil)	.006/# - 100%
.536/Gal-Dil	Gal (dil)	.056/Gal - dil.
.894/Gal-100%	Gal (undil)	.080/Gal - 100%

IRON PELLETS

Kore Industries Georgetown, S. Carolina	1-803-546-2525
Texas Steel Beaumont, Texas A.R. Holzworth	1-713-768-1251
Oregon Steel Bill Bottomley	1-503-286-9561

Midoex

Source: Charleston Steel Mills

Lime

Source: Paul Spur- , Douglas, Ariz.

Processed - Stock Dust (62% CaO)

$6/Ton or $.003/#

Sodium Thiosulfate: ($Na_2 S_2 O_3 \cdot SH_2O$

Source: Hills Bros., Tucson Ariz.

	Bags	Price
100#	1-10	$24.60/100 #
Bags	20	$19.70

$0.197/#

Salt: (NaCl)

Source: Southwest Salt - PHX

$15/ton + $15/ton Freight = $\frac{\$30}{2000\#}$ or 1½¢/#

SUMMARY

Chemical & Reagent Cost - Delivered to Tombstone

Solutions

Name	(% Soln.)	Cost-Dil	Cost/# - 100% (Tombstone)
NaOCl	14%	75¢/gal	$.560/#
$FeCl_3$	44%	1.12/gal	.216/#
$FeCl_2$	30%	47.7¢/gal	.150/#
H_2SO_4	70%	5.6¢/gal	.006/#
HNO_3	60%	53.6¢/gal	.078/#

Solids

Name	Cost/# - Tombstone
$Fe\ SO_4 \cdot H_2O$	$ .1265/#
$Na_2S_2O_3 \cdot 5\ H_2O$	.197/#
NaCl	.015/#
Lime	.003/#
NaCN	.587/#
Zn Dust (Memllite)	.662/#
Na_2S	.248/#
Lead Acetate	2.30/#
Na_2O	.18/#

SR-3 Resin
$ 6.50/# - Small Lots

LEACH TEST SOLVENTS
For Bench Scale ; then Barrel; the pilot

Type of Solvent Phase	Case A (Limontic Clay-Ls	Case B (Limontic Clay-Ls.)	Case C (Mn-in Ls. with limonitic jarosites) →
Pre-treatment	H_2SO_4 + NaCl + NaOCl	H_2SO_4 + NaCl + NaOCl	H_2SO_4 + Fe Cl + NaCl
Leach (ag)	$Na_2S_2O_3 \cdot SH_2O$	NaCN / Lime	$Na_2S_2O_3\ SH_2O$ or CN

Computation of Solvent Concentrations Having the Same Cost/Ton Solution

Method A: Cost/Ton Soln. Method

Example:

X =1/# & concentration = 1#/Ton Soln.

$$\therefore \frac{ml\,X}{l} = \frac{\$.0011023/\#}{l}\left(\frac{\text{Dil. Cost}}{\text{Gal}/\$}\right)\left(\frac{3785.4118\,ml}{gal}\right)$$

Method B: # / Ton Soln. Method

$$\therefore \frac{ml\,X}{l} = \underset{\substack{\#/\text{TON} \\ \text{(Same cost basis)}}}{\text{Economic}}\left(\frac{\text{Ton Soln.}}{240\text{ Gal.}}\right)\left(\frac{\text{Gal}}{3.7854118\,l}\right)\left(\frac{\text{Gal}}{\#X}\right)\frac{3785.4118}{\text{Gal.}}$$

Solvents/Reagents
Delivered to Tombstone

Table of Comparative Solvent Strengths (50¢/Ton Solution)

Solvent	$/#	50¢/Ton #/Ton	gr/ℓ	ml Soln./
H_2SO_4 (70%)	$.006	83.3	-	37.2
NaOCl (14%)	.560	.9	-	2.8
$Fe\ Cl_2$ (30%)	.150	3.3	-	4.4
HNO_3 (60%)	.078	6.4	-	3.9
$FeCl_3$ (44%)	.216	2.3	-	1.9

Solvent	$/#	50¢/Ton #/Ton	gr/ℓ
NaCl	.015	33.3	16.7
$Na_2S_2O_3 \cdot 5H_2O$	.197	2.5	1.3
NaCN	.587	.9	.45
$FeSO_4 \cdot H_2O$	.1265	4.0	2.0

Consultants in:
- Hydrometallurgical recovery
- Heap and conventional leaching
- Precious and base metals
- Uranium/Vanadium
- Tungsten

Worldwide Mobilization

Divisi
Southwestern Exploration Assoc

4500 E. Speedway, Su
Tucson, Arizona 8
(602) 795-

Richard F. Hewlett
Vice President and General M
Chemical Engineer
Mining Engineer

S.E.A. Hydromet, Inc.

NaCN Titration

A. General

A cyanide mill solution is titrated for NaCN content using silver nitrate and potassium iodide as an indicator.

B. Stoichiometry

$$AgNO_3 + 2\ NaCN = AgNa(CN)_2 + NaNO_3$$

Molecular Weight	$AgNO_3$	2 NaCN
	169.89	98.04

C. Parameters

For a 20 mℓ sample:

$$\frac{1\ \#}{\text{Ton Soln.}} = 500\ \text{mg/liter}$$

Therefore, for a 20 mℓ sample;

500 mg/liter :: X/20 mℓ X = 10 mg CN

Grams CN titrated per liter:

Divisions Per mℓ	Grams CN/liter
1	10
4	2.5
13.9	0.72

Standard Preparation:

$$\frac{\text{Grams CN}/\ell}{98.04} :: \frac{X}{169.89}$$; where X = grams $AgNO_3$/liter

Divisions/mℓ	Standard Grams $AgNO_3$ Per Liter	# CN/ton solution / mℓ reading X Factor
1	17.329	1.00
4	4.332	.25
13.9	1.248	.072

D. Standard Preparation

Disolve the desired Silver Nitrate in one liter of distilled water.

The KI is a 5% solution.

E. Procedure

1. Measure 20 mℓ cyanide solution
2. Add 3 drops KI solution
3. Add enough $AgNO_3$ standard to zero buret reading
4. Add drop-wise $AgNO_3$ untill a constant yellowish-white turbidity is obtained
5. Record mℓ used for ghosts to turn to clouds (end-point)
6. Multiply by factor or use table

F. End-Point Standards

In order to determine the proper end-point, cyanide standards must be prepared to calibrate the titrator's "vernier cueball".

Cyanide Standard	Standard Preparation
3 #CN/ton	1500 mg. CN/ℓ
2 "	1000 "
1 "	500 "
.5 "	250 "
.25 "	125 "

CYANIDE TITRATION TABLE (1.248 gr. $AgNO_3$/l)

mℓ $AgNO_3$ Standard	# CN/ton solution
0.00	0.000
1.0	.072
2.0	.144
3.0	.216
4.0	.288
5.0	.360
6.	.432
7.	.504
8.	.576
9.	.648
10.	.720
11.	.792
12.	.864
13.	.936
14.	1.008
15.	1.080
16.	1.152
17.	1.224
18.	1.296
19.	1.368
20.	1.440
21.	1.512
22.	1.584
23.	1.656
24.	1.728
25.	1.800
26.	1.872
27.	1.944
28.	2.016
29.	2.088
30.	2.160

RECEIVED JUL 17 1979

P-418

July 12, 1979

Memo to: J. A. Briscoe, SEA; cc: T. H. Schloss, R. F. Hewlett

From : J. G. Dean

Subject: Selection and Evaluation of Tombsone Ore Samples.

Dear Jim:

We have been applying pretreatments and leach tests to the various ore samples supplied by Ed and Dick. Although the actual data available are quite limited, they are supplemented by more extensive qualitative observations and the combined information seems to merit discussion.

We applied first comparable thiosulfate and cyanide leaches to the 10 lb shale and quartzite sample from the north ramp(Ed's #62379B), as described in the memo to Dick of July 3. The fire assay results from Jacobs are summarized below:

	Ag	Au
Initial results, sample prepared by Jacobs	1.40	.005
Feed pulp prepared by JGD ----------	1.85	.01
Tails from thiosulfate leach ----------	1.80	.005
Tails from cyanide leach ----------	1.35	.02

The first two samples should have been identical, unless Jacobs did not conform to the Richard's minimum sample guide as a function of particle size. It would be of interest to have their full practice in handling this type of material, and also their evaluation of the precission which can be expected from their fire assays.

The second point of interest is that the figures for gold have a whimsical quality. My subsampling was with a very fine grind with meticulous mixing and splitting. These data rather conclusively suggest that we cannot use fire assay of tails as a guide to leaching unless we can achieve more precision. Your suggestions on this point will be appreciated.

If we can accept the silver assays, at least on the fine pulps, as more precise, then we can conclude that the thiosulfate was ineffective in leaching the silver (2.7% dissolution) and that the cyanide was only slightly more effective (27% dissolution). These observations are qualitatively in accord with my sulfide precipitation tests, especially as to the ineffectiveness of the thiosulfate.

Similiar tests on some of the other samples supplied by Ed in this same shipment suggest that the low silver values resist dissolution even under ideal conditions. There seems no evidence of the usual silver carrying minerals; rather there is a suggestion that the silver may be present as refractory silicates. Can mineralogy help us find some more responsive feeds?

JGD:bm

John

RECEIVED JUL 20 1979

July 12, 1979

P-418

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JGD:bm

John

P-418

RECEIVED JUL 19 1979

July 16, 1979

Memo to: J. A. Briscoe, SEA; cc: THS, RFH, WES.

From : J. G. Dean

Subject: Mineralization and Leaching Characteristics of Tombstone Ores.

Dear Jim:

With further reference to my memo to you of 7/12 and the one to Ed of 7/13, the samples from the heap recently supplied by Ed give a good crosssection of the mineralogy, except for the silver halides, and the obstacles to extraction of gold and silver by various schemes. The samples subsequently supplied by Dick do seem to contain some silver halides and are proportionately more responsive to direct leaching.

Sample 002209 representative of the Mn-rich rocks on the south end of the heap with a Jacobs fire assay of Au .01, Ag 7.30 Toz/T turned out to contain almost 3% copper present as basic carbonates directly leachable in ammonia- ammonium carbonate solution. A substantial part of the silver dissolved along with the copper as though it were present as a double carbonate instead of being associated with the manganese oxides. Material of this type could range from a cyanocide nuisance to a valuable feed in its own right.

There appears to be definite potential in selected pretreatments for specific ore fractions for liberating the values such as acid for the hydroxy sulfates and possibly for the manganese oxides, especially in association with reducing agents; and in the use of oxidizing agents such as hypochlorite for releasing silver and gold locked in base metal sulfides and carbonaceous materials. Effective combinations of these reagents might be applied with special effectiveness in a milling operation with a specific feed.

There seems to be very limited potential for applying pretreatments, especially those involving a sequence of reagents, in typical heap leaching. There seems to be no potential for applying combination leaching methods to the present heap because of the conglomeration of minerals present and excessive consumption of reagents in an unproductive way, e.g. inter-reaction between calcite and limestone with sulfuric acid before attack on the jarosite.

The ideal feed material is one with a substantial part of the silver present as halides with a weal defined tendency for these halides to be exposed along fracture planes rather than being shot through the ore mass so as to be accessible only in fine grind= ing. The other silver minerals form a kind of spectrum of leach- ability which extends down from the halides to almost nil for the silver locked in silicates and some of the sulfides. The first important clues can be gotten from the mineralogy, but realistic tank and heap leaching tests are probably essential for conclusive planning. The closest possible coordination of all these factors is urgently needed to achieve production in our operation.

JGD:bm

JGD.

P-418

DAY/TIMER Time-Saver LETTER

IN REFERENCE TO:

Southwestern Exploration Assoc., Inc.
4500 E. SPEEDWAY, SUITE 14
TUCSON, ARIZONA 85712

(602) 795-6097

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR James Briscoe,
Dr. John Dean
Tom Schloss

HOW TO USE THIS DAY/TIMER Time-Saver LETTER TO SAVE TIME.
Type or write your reply in the space below. Then mail the white copy to us and keep the pink copy for your files. You'll save time and effort, and we'll have your answer much faster! Thank you.

MESSAGE

FOLD

DATE: July 17, 1979 (Tues). FOLD

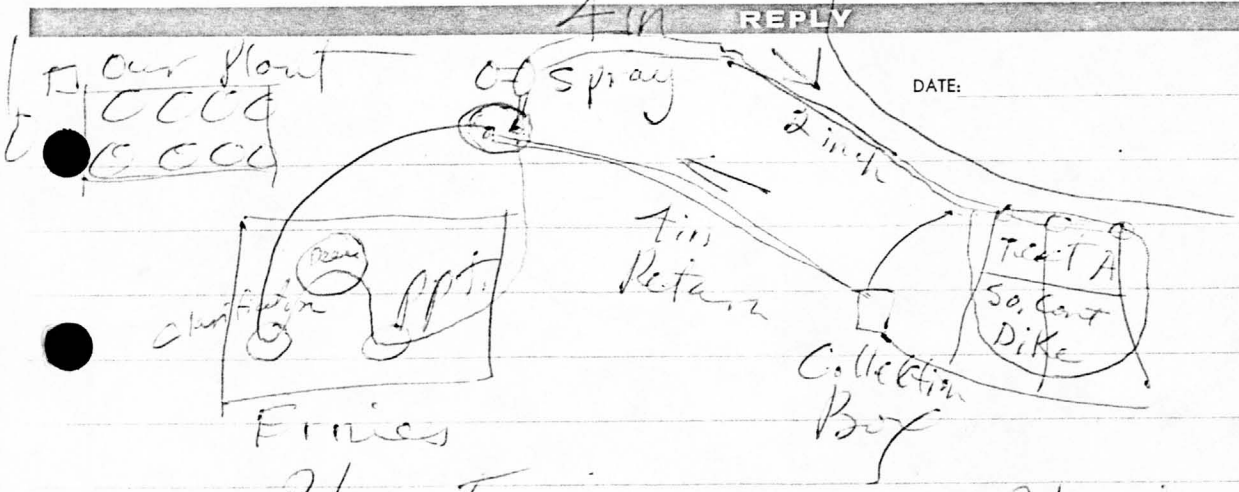
Plant

Fixed problem with vacuum pump. Plant and entire leaching system is now operative. Needed to borrow 4-2-4 in coupler caps for 2" because George Jewitt borrowed our 4 inch couplers.

FOLD

BY

REPLY



DATE:

BY Plant - Leach System

DAY/TIMER Time-Saver® REORDER FORM No. B2420L, DAY-TIMERS, Allentown, Pa. 18001

DAY/TIMER time-saver LETTER

IN REFERENCE TO:

Southwestern Exploration Assoc., Inc.
4500 E. SPEEDWAY, SUITE 14
TUCSON, ARIZONA 85712

(602) 795-6097

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR Brisse-Dean-Schloss
-2-

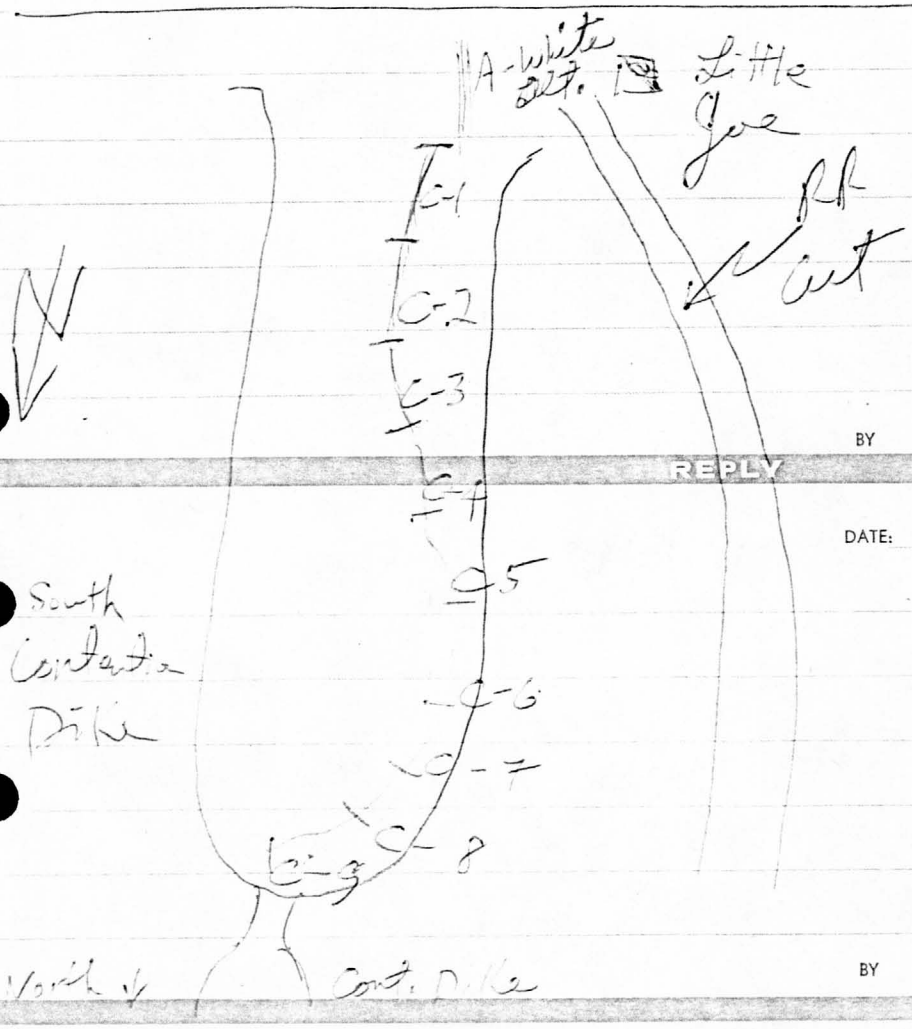
HOW TO USE THIS DAY/TIMER time-saver LETTER TO SAVE TIME.
Type or write your reply in the space below. Then mail the white copy to us and keep the pink copy for your files. You'll save time and effort, and we'll have your answer much faster! Thank you.

MESSAGE

FOLD DATE: July 17 1979 FOLD

Plant now works and we will circulate tomorrow-Wed.

Have $AgNO_3$ + KI for CN titration



Sample Channel - 35' long
→ from I C-1 35 feet horiz.

Sample #	t. oz. ton Ore Ag	Cu	$ 250/8
C-1	.24	—	$1.92
C-2	1.02	.035	16.91
C-3	1.20	.031	17.35
C-4	2.52	.048	32.16
C-5	1.17	.031	17.11
C-6	1.71	.053	26.93
C-7	3.72	.061	45.61
C-8	4.02	.053	45.41
C-9	.33	.026	9.14
A	.27	.018	$6.66

FOLD BY

REPLY

DATE:

BY

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FOR Brisco-Dean-Schloss

-3-

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MESSAGE

FOLD

DATE: July 17, 1979

FOLD

Procedure

The above so. Contention Dike horizontal channel samples were taken along 35 feet of the NW wall of the dike structure with a rock-chip hammer - collecting 5 pounds. The 5 pound sample was split and 100 grams of sample was used with a 300 ml cold CN solution at 1 gr/l (CN). They were sample run - which is a mini barrel test. No crushing or pulverizing.

FOLD

FOLD

BY

REPLY

DATE: The results should be recoverable Au/Ag with CN.

BY

REORDER FORM No. B2420L, DAY-TIMERS, Allentown, Pa. 18001

DAY/TIMER Time-Saver LETTER

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TUCSON, ARIZONA 85712

(602) 795-6097

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR Brisco-Dean-Sanders
A-

HOW TO USE THIS DAY/TIMER Time-Saver LETTER TO SAVE TIME.
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MESSAGE

FOLD DATE: July 17, 1979 FOLD

The dozer has ripped a large entrance in the south of the dike feature and has pushed the ore sampled by C-1 to C-9 into an area that we will load for test B & Contention Dike South

FOLD We have made progress in FOLD

BY

REPLY

DATE:

connecting the north + south portions of the dike structure. The ore looks very good - is easy to rip + push with the D-6.

BY

DAY/TIMER Time-Saver® REORDER FORM No. B2420L, DAY-TIMERS, Allentown, Pa. 18001

DAY/TIMER time-Saver LETTER

Southwestern Exploration Assoc., Inc.
4500 E. SPEEDWAY, SUITE 14
TUCSON, ARIZONA 85712

(602) 795-6097

IN REFERENCE TO:

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR Brisco-Dean-Schloss
-5-

HOW TO USE THIS DAY/TIMER time-Saver LETTER TO SAVE TIME.
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MESSAGE

FOLD DATE: July 17, 1979 FOLD

Doing density studies on so. end Contention Dike are (Little Joe area). I want to repeat the tests tommorrow. Found that when Ed Rice - first day on a scraper Sat. hauled Sat - he was only getting 8 tons per load. Dusty is working some (not much) with him to improve.

FOLD FOLD

Think your plane was overhead around noon (11) till 2?

BY

REPLY

DATE

Look forward to the photos.

I need help sampling the Contention Dike - Big area

Sincerely - R.F. Hewlett

BY

DAY/TIMER time-Saver® REORDER FORM No. B2420L, DAY-TIMERS, Allentown, Pa. 18001

P-418

MEMO

To: R.F. Hewlett

Copies To: John Dean, Tom Schloss

From: J.A. Briscoe

Date: July 19, 1979

Re: Sample Collecting Procedure, Tombstone Project P-418, Tombstone Hills, Tombstone Mining District, Cochise County, Arizona

The following will standardize our sample collecting procedures for all future sampling at Tombstone, and will remain in effect until written changes should be received superceding this procedure, by myself and/or John Dean.

The main parameters in sample collection are:

1. The sample should be representative of the rock or mineral environment which it is meant to test. Therefore, great care should be used in determining the sample boundaries in relation to:
    a. Rock type
    b. Mineral zonation
    c. Oxidation state
    d. Geologic structures
    e. The amount of continuity that can be determined for the above characteristics so that the volume of rock represented by the sample can be calculated.

2. Whether or not the sample is representative of the rock volume it is meant to test is a critical factor which relates to:
    a. Size of the sample taken
    b. Coarseness and degree of homogeneity of the mineral contained within the sample

c. Its physical characteristics with regard to breaking and ease of homogenization

d. Its unit value.

This is a very complex subject as you know. However, correct sampling is critical to our evaluation of the precious metal content of material proposed for treatment at Tombstone. Appended is a Xerox copy of page 5-72 to 5.4.2 of the SME Mining Engineering Handbook, Volume 1 which is a good guide to sample size and crushing sizes required before splitting. This guide should be adhered to as closely as possible.

S.E.A. has used standardized sampling procedures over the last 5 years. These procedures include numbered sample sacks, wooden sample stakes with ~~possible~~ metal tags, character sample sacks, standard geochem assay forms, and ~~topography~~ of the sample site after the sample has been taken, using a 35mm camera. Notes on the photography are taken on standard NCR photographic note forms similar to the geochem sample form.

I'm transmitting to you with this memo 150 individual forms issued for 150 samples and 150 photographs, and 10 rolls of Kodak Ektachrome ASA64 35mm in 36-shot cassettes. I'm also transmitting to you 100 8-lb. size sample sack kits which include a cloth sample sack with number imprinted on it and two wooden stakes to be placed at the beginning and end of the channel sample. These wooden stakes have metal embossable tags for annotation of the sample number. Also enclosed is a plastic character sample sack. Monday I am sending you large 100-lb. ore sacks with essentially the same kit attached. The sampling procedure will be as follows: identify a specific rock type - mineralogic type or other feature which will be meaningful to sample. Obviously for very large features in excess of 20 to 30 feet (this may vary according to circumstances) multiple samples should be taken. First, mark the sample location with green spray paint, then take channel chip samples or other samples as

degrees to quartz-sericite-clay assemblages. The subject includes many variations among districts. A simple model consists of a core of potassic alteration surrounded vertically and laterally by quartz-sericite. Vertical dimensions of this simplified model are uncertain because the total vertical length is not known for any one deposit. Indications are that minimums of at least a few of the largest deposits were, prior to erosion, at least 10,000 ft and probably much greater. It is important to attempt to estimate the vertical position which a newly discovered deposit may occupy in a model. The *tops* of several major ore bodies have been discovered in recent years at depths of 2,000 to 3,500 ft. These discoveries have been due to recognition of vertical and horizontal zonal characteristics.

2. The interpretation of leached outcrops, or "capping," is based on the subtleties of the chemistry of oxidation and leaching of iron, copper and molybdenum sulfide minerals, and on the geologic *history* of those processes. Oxidation proceeds slowly, and in many regions it has been outstripped by erosion because these disseminated deposits all originated in broad belts of contemporaneous or subsequent mountain-building. If original iron/copper sulfide ratios were less than about 5:1, indigenous limonites having a black to seal-brown color, with a bright-red streak (in contrast to transported limonites with similar color but an orange streak), indicate that chalcocite originally was present. *Diffused* orange, brick-red and yellowish limonites indicate that pyrite with little, if any, copper sulfide was present. Parallel thin ribs in cavities, together with brownish limonites, suggest the original presence of chalcopyrite. Pale-yellow ferro-molybdite, of course, indicates that molybdenite was present. These features are quantitatively diagnostic *only* if the original metal contents were more than about 0.5% Cu or 0.2% MoS_2.

The evaluation of exploration possibilities of newly discovered disseminated sulfide prospects involves a number of variables and uncertainties, but many aspects of the problem are subject to understanding and prediction if geological observations of physiographic and tectonic history, rock types, structures, alteration and limonites are made first.

5.2.5D—SPECIAL EXPLORATION TECHNIQUES—PLACER DEPOSITS

JOHN H. WELLS

Placer exploration involves four basic steps: (1) reconnaissance of the lands, (2) sampling, (3) sample processing, and (4) evaluation of results. These steps may be taken separately or combined. Each is important in itself and each may be critical in relation to the end result. Work related to exploration drilling or to otherwise testing a placer deposit commonly is referred to under the general term "prospecting."

Reconnaissance—A preliminary inspection of the lands should precede any detailed placer examination or sampling work. If the property is small, this may take less than an hour but if it is large, or if it contains significant mineral exposures, several days of presampling reconnaissance may be in order. Aerial photographs can be most useful in dealing with topography, drainage and many other features not easily seen on the ground. There is an unfortunate tendency to minimize the importance of the reconnaissance step. The history of a district can help in selecting and interpreting placer samples in the reconnaissance phase. Any sign of old workings should be carefully investigated. Production records are invaluable, and nearby mines should be visited and examined whenever possible. Reconnaissance procedures must be tailored to suit each situation, and the time and effort required depend on the examining engineer's experience and perception.

The reconnaissance evaluator should have a thorough knowledge of placer mining and the various operating methods. In particular, he should know the principal limitations and major pitfalls.

Sampling—Contrary to popular belief, representative placer samples are difficult to obtain. In most cases, sample results require careful interpretation. Some important considerations are:

Large Particle Size—The typical placer deposit is a mixture of fine sand, pebb and boulders varying from a few tens to perhaps hundreds of pounds each, maki it very difficult to take a small representative sample.

High Unit Value of Gold—Any error in mineral content of a placer sam will be highly magnified in the end result. In a commercial placer the relati amount of gold (by volume) may be on the order of one part gold to a hund million parts of gravel. Ground having a gold-gravel ratio 1:100,000,000 by volu is worth approximately 15¢ per cu yd @ $35 per oz. A single small particle gold in a pan of gravel can be equivalent to 2 to 5¢ per cu yd. This is illustrat by Table 5-4.

Minerals Other Than Gold—Placers chiefly valuable for minerals such monazite, rutile, cassiterite, ilmenite, etc., generally are easier to sample and evalu than gold placers. These minerals commonly have a relatively low unit va and make up a larger part of the mass, so that extraneous particles have l

TABLE 5-4—Effect of Single Small Gold Particle on Placer Sample of Typical Size

Size of Drill Hole or Channel, In.	Size of Gold Particle and Effect on Sample, $ per Cu Yd		
	20-Mesh (6.57 Mg)	40-Mesh (0.91 Mg)	60-Mesh (0.27 Mg)
7½ dia.	$0.58	$0.08	$0.02½
5¼ dia.	1.18	0.16	0.05
3 dia.	3.60	0.50	0.14
3 × 6	1.42	0.02	0.06
6 × 6	0.71	0.10	0.03
6 × 12	0.35	0.05	0.01½
12 × 12	0.18	0.02½	0.00¾
16-in. pan*	1.18	0.16	0.05

*180 pans per cu yd.

Values shown are those which would result from one gold particle in a 1-ft sample increment or drive, and are based on gold weights determined by the author, with gold @ $35 per oz.

effect on calculated values. Often such deposits are of well-sorted small-si d detr materials, such as beach sand, making it easier to obtain representative s es.

Erratic Distribution of Values—Valuable minerals are not distributed unifor through the typical placer deposit. Heavy minerals and gold in particular commo are confined to narrow discontinuous pay streaks with little or no value betw them. Coarse gold is exceptionally erratic and reliable evaluation of results require more than taking a few small samples and an exercise in arithmeti

In theory, these problems can be overcome by taking bulk samples (measu in tons rather than pounds) but this seldom is resorted to in actual prac Some argue that taking a large number of small samples will statistically ca the eccentricities of a given deposit, but practical considerations seldom pe this approach.

Industry Practice—In modern practice by established placer organizations, employee is placed in charge of evaluation who has wide experience with type of deposit. Limited credence may be given to any one sample and, a thorough study of all prospecting data (perhaps with taking of additional c samples), experience-based adjustments, or "correction factors," are applied to initial sample data where needed. Successful placer companies rely as much experience and the insight of management and prospecting personnel as they on initial sample results.

RECEIVED JUL 30 1979

July 24, 1979

P-418 file.

Memo to: J. A. Briscoe, SEA; cc: THS, RFH

From : J. G. Dean

Subject: TEI Project. Preliminary Tests on Heap.

Dear Jim:

In accord with your suggestion for sampling the heap, we took one exploratory sample during our visit last week and carried it through an exploratory test procedure.

Dusty operated the backhoe with the objective of trenching a pit 2'x10'x10' deep. The sides tended to cave until the trench widened to 6-8', but we got a fair sample, split it with the backhoe and finally picked up about 500lb for transport in the scoop to the work area. This operation took about 30 minutes.

We then coned and quartered the sample on a plastic sheet, removing about 25% of plus 2½" pieces by handcobbing. The -2½" material contained perhaps 40% -¼" and seemed a good mixture for percolation testing.

Approximately 200lb dry basis was charged to a heavy plastic barrell and leached by recycling 2lb sodium cyanide/T plus lime for 4 hours. The leach solution remained virtually barren as judged by the sodium sulfide test. It seemed quite definite that further leaching of this particular area of the heap would yield at best very marginal results.

We then broke up the +2½" material with hand hammers until 10lb was reduced to about -1". The product did not contain many fines, perhaps 5-10% -¼"; it was leached by hand agitation in a pail. Within 30" we got positive silver dissolution estimated at 0.4Toz/T ore. This crude and preliminary test seemed to confirm the idea that there are recoverable values still present in the coarser pieces of the heap, but whether they are of any economic interest remains to be established.

We also made a 200lb barrel test on material brought down from the area of the cut where we crawled into the addit for our discussion. Within 10 minutes of leaching we got a very positive test for silver and the solution soon corresponded to greater than 5Toz/T in the feed. In contrast to the heap, there seems to be every encouragement to develop at least a conclusive test program for the Contention dike area.

A well organized sampling and test program could be quite expensive and time-consuming. It should lead to data showing realistic cyanide leaching results which can be expected from the method to be used, as well as ore reserves, mining costs, etc. My general impression is that we will have to beef up our technical capabilities by orders of magnitude to do a conclusive job and that the economic success of the program can not be taken for granted. It seems particularly important at this critical stage to project both a clear plan and a realistic budget.

John

July 23, 1979

Arizona Bureau of Geology & Mineral Technology
Geology Building Room 134 , Univ. Arizona
Tucson, Arizona 85721

Memo of visits by
J. A. Briscoe
T. H. Schloss
J. G. Dean

David D. Rabb, Mining Engineer

Subject: Gold and Silver Production, Tombstone Area

A brief visit with a tour of the metallurgical facilities was made on July 19, paving the way for a longer discussion on July 23. Mr. Rabb teaches a course on heap leaching and has become thoroughly familiar with the Tombstone area through his work for the state.

He advised that he felt cyanide leaching, especially by the heap technique with its low labor requirements, was the most promising method of treating the Tombstone ore. He appeared to be familiar with all of the older methods such as the Patio process, salt roasting, thiosulfate leaching, etc. and supplied on loan a photo copy of a book by M. Eissler, "Metallurgy of Silver", Van Nostrand 1891. He was also familiar with the work of the Bureau of Mines at Reno including the hypochlorite process, acid pretreatment, agglomeration for induced percolation, etc. and seemed to have high regard for the quality of the work there except perhaps for the economic interpretations.

Assays

Mr. Rabb stated that fire assays on samples properly prepared according to the Richard's rules were still regarded as the most reliable method of determining total gold and silver. Atomic absorption is best for determining leach solution concentrations; these data can be supplemented by fire assays on the tailings, and this combination of data permits establishment of an accurate metallurgical balance which provides a conclusive check.

Leaching Tests

Mr. Rabb confirmed that particle size was a key variable in leaching tests, first because of the critical relationship with the minimum permissable sample size, then as a factor both as to leaching rate and ultimate leachability. 200-300 pound barrel tests on samples crushed at least to minus 1" is one of the most effective leaching tests. He really prefers to crush to minus ¼" for these tests as it speeds the extraction, facilitates comparisons between ores, and aids in the study of other key variables. Finer grinds should be used in testing smaller samples down to at least -100 mesh for bottle tests and fire assays involving 30-300 g. of ore.

Recoveries and Pretreatments

Mr. Rabb suggested that ores vary widely in their responses to leaching tests and that optimum economic results may be obtained at recoveries

of 20% or even less. The Tombstone ores contain precious metals in several forms which exhibit a wide range of responses to leaching. The manganese-rich components are typically refractory to leaching; acid pretreatments are not regarded as having practical potential in heap leaching for several reasons, such as the high quantities of acid required, e.g. 1000 lb/T ore, to react with the limestone, the formation of equally large quantities of $CaSO_4 \cdot 2H_2O$ which expand and stop percolation, the dissolution of heavy metals such as zinc, copper, iron, etc. and related environmental hazards.

Heap Preparation

The preparation of an impervious pad for the heap is of great importance. The use of clays is preferred over plastic sheeting because the latter is likely to get perforated during the loading process and involve hidden leaks. Desert sands tend to be porous and are to be avoided. Old tailings can be very effective if the grind is fine enough. The pad should be tested by impounding water over specific areas and measuring the seepage loss as a function of time.

The control of particle size in setting up the heap is an important consideration, but the cost of crushing and extra handling must be more than offset by improved recoveries. Penetration of fissures in rocks by leach solutions takes time and may be only partially effective. The leach solution must penetrate to the minerals, dissolution occur and then the reverse migration take place. Dissolved values after reaching the interstices may still be lost by precipitation or adsorption as the solutions percolate down to the pad. Thus excessive fines can aggravate losses and slow percolation. A heap of minus 1" to 2" is often a good compromise, but good results may be achieved with coarser material and longer leach times.

Dissolved air in leach solutions is essential to the dissolution of gold and some silver minerals, notably sulfides. Better results are often obtained with the use of shallow lifts. New small lifts are added as extractions begin to wane. Continued recoveries at reduced rates from the lower lifts may be achieved over long periods, sometimes for years. Good heap leaching is an art but is facilitated by effective metallurgical control. Mr. Rabb suggested that Charlie and Louis Escapule have perfected a good technique for the Tombstone area.

Mining Control

Ore sampling and testing is important both for outlining economic reserves and for separating ore from barren reject material during the mining process. A trained geologist with pertinent experience can usually recognize visually suitable feed material and is essential to this part of the project. Mr. Rabb suggested that Bailey Escapule, a recent graduate in geological engineering, would be ideal for this work. He might be able to suggest other recent graduates and help in finding qualified people for other jobs in the operation.

JGDean:fm

John G. Dean

P-418

Consultants in:
- Hydrometallurgical recovery
- Heap and conventional leaching
- Precious and base metals
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Worldwide Mobilization

Division of
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(602) 795-6097

Richard F. Hewlett
Vice President and General Manager
Chemical Engineer
Mining Engineer

S.E.A. Hydromet, Inc.

July 31, 1979

Mr. James Briscoe
S.E.A.
4500 E. Speedway
Tucson, Arizona(85712)

Dear Jim:

Enclosed please find my Daily Progress Reports for period July 20 through July 31, 1979.

Please notice the revised August budget follwoing the July 30 progress report.

Also, I called Al Watterson and informed him of the decision not to hire him at this time and he told me that he would call you concerning employment.

I will look forward to your visit on Thursday, as the dozer work has exposed a great deal that I am sure you will be interested in from a geological and ore reserve point-of-view.

I would appreciate any photo's to the 1 inch= 300 and 100 feet that you have developed for the Toughnut to Grand Central areas. Also, Bill Hight as well as myslf are interested in the 18 unpatented claim area of TDC's for assessment and meaningful exploration in the area of the Tombstone Extension group.

Best personal regards.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

Briscoe, Schloss, Dean

July 20, 1979

James Briscoe, Tom Schloss, and John Dean spent the morning reviewing previous progress and futhur plans.

James Briscoe showed how he would like the samples taken on rock outcrops in the railroad cut. This involves determining where the sample interval should be taken, marking this interval with embossed stakes having the sample number on and a spray-pint line between the stakes indicating where the sample was taken. The sample interval is then recorded concerning the geology-rock type, alteration, etc., and then photographed after the sample is taken(having the sample bag in the photo).

James Briscoe left a number of sample bags and it was agreed that I should order additional bags to continue the sampling.

It was decided to conduct back-hoe tests on the heap for barrel leach tests.

Additional discussion of the future plans are presented in my July 27 Report.

July 21, 1979

Tom Schloss and John Dean continued to review the project and discuss future plans.

The back-hoe was taken up to the north-center of the heap and a back-hoe trench was dug according to James Briscoe's suggestion. John Dean's memo of July 24, 1979 discusses the details. A large sample was obtained and a barrel-leach test was made with the preg being analyzed with Na_2S as the indicator of silver in solution. This qualitative test produced low silver results, possibly about .2 troy ounces Of silver. This was compared with a large back-hoe trench sample from the south portion of the Contention Dike that in a similar barrel test- produced about 5 troy ounces/ton of silver in less than 15 minutes.

Based on the above and previous leach test results from the Contention Dike, a sampling program for the Dike was outlined and discussed by Messrs. Schloss, Dean, and Hewlett(again, see July 27 Report).

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

Messrs. Briscoe, Schloss, & Dean

July 22, 1979

Messrs. Schloss and Dean were in Tombstone untill about 4:00 o'clock reviewing alternative future plans and discussing the budget for the Month of August. RFH prepared a budget for August and September that was discussed by Messrs. Schloss, Dean, Dusty Escapule, and Hewlett. Tom Schloss left a copy of the budget at the S.E.A. office for James Briscoe.

Precips collected over a lapse time of several days were melted and Tom Schloss took them back(dore) for analysis.

Coarse ore was crushed by hand(refer to Dr. Deans memo of July 24) and leached in a pail. Indications from this test using sodium sulfide was that significant values were leached-indicating the worth of crushing. Numerous contacts were initiated to locate and crusher for production and to obtain one for lab-barrel leach tests. The necessity for screening was emphasized by Dr. Dean.

July 23, 1979

Tom Schloss took my typewriter in for repair, which will improve the Daily Reports.

The sampling of the Contention Dike-south was organized according to James Briscoe's sampling proceedure. After considering the storage problem, conversations were made with the "Gun Company" personnel, who revieled that the "Gun Company" was moving to Bisbee within a matter of days-or less than a week. Obviously, the old '71 Minerals building was perfect for the storage of the large number of samples to be taken over the next months.

Old drill-holes were found in the Contention Dike area which seem to be done by '71 Minerals-possibly Ed Speer(DH's # 20, 21, 22, and 16 were identified).

Work was done on the July 27 Report.

The initial location of the barrel-leach tests will be where the present plant is located-on the bench. Barrel-leach supplies will be purchased when the money is budgeted and approved.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

Messrs. Briscoe, Schloss, & Dean

July 24, 1979

Bailey Escapule started working on the geological descriptions and guiding the sampling. RFH spent considerable time with Bailey reviewing the proceedure and studying where James Briscoe took his sample in the "Railrod-Cut". Various rock units were identified and the alteration facies in the hornfels that overlie much of the area were discussed. Even though much of the Bisbee hornfels are blocky and appear unmineralized, there are local shear zones that are mineralized and very careful sampling must be done to identify ore and waste areas in these overlying hornfels for ore control.

It is important that the structural geology be done in order to provide local control for the ore bodies or ore zones. For example, it is noted that the Contention Dike is faulted on the north end of the "Contention Dike Glory Hole"; the northern continuation of the Dike past the Pump Shaft has moved west according to old maps. Also, these maps show a "parallel northerly extension of the Contention Dike" further to the west. Interpretation of the aerial photos with ground truth-mapping will confirm previous geological mapping.

July 25, 1979

The sampling has continued at a faster rate than expected and it is obvious that consererably more sample bags will be required. Initially 500 will be required and another 500 could be required through September. The bags that James Briscoe left on July 20, 1979 were used in about 1½ days, which was about 120 samples.

Screen size determinations were made, as discussed in the July 27 Report.

Bailey worked with the samplers, and his observations were discussed with RFH. The easterly wall of the railroad cut appears to have four rock units exposed stratigraphically. The westerly wall appears to be faulted from the east wall. James Briscoe's observations when available will be very much appreciated.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

Messrs. Briscoe, Schloss, & Dean

July 26, 1979

Today, I was informed by Loius Escapule that he did not want to exchange any additional dozer time(from our Modern Equipment allotment), scraper usage, or other of our equipment or possible services for Atomic Absorption analyses or pulverizer usage. His reason was that they(Charley and Loius) would be to busy using their lab facilities with their exploration/development on the Tripple X claim. They are renting from Modern Equipment a $3,000/month excavator with a 19 foot hoe. Their early work indicates some high-grade veins that they are trenching. Their hope is to develop enough open-pit ore to continue sampling and mining. They plan to crush the ore, just as we would be doing for the higher-grade ore in the Contention Dike. Also, they informed me and Tom Schloss that Bailey would no longer work for us-again because he was now to busy with their exploration/development.

Left in the breach was whether they want any information that we would develop in the Illinois area-Michigan Central, which is to the southwest of the Little Joe shaft and easterly of our Grand Central claim. Also, we have much data for their "State of Maine" area done by Austral Oil and James Briscoe for '71 Minerals. They have expressed great interest in that data, but now I question what to do concerning some trade with them for either exploration rights-AA determinations, etc..

Worked late on the July 27 Report.

July 27, 1979

Ordered chemicals required for additional test leach studies.

Left a copy of July 27 report with Chris for James Briscoe(original) and two for Tom Schloss-he recieved one on July 28.

Picked-up sample bags. They will be inventoried Saturday and temporarily stored in the trailer, then moved to the '71 Minerals Building. How the samples are to be analyzed must be resolved between James Briscoe,Dr. Dean, and Tom Schloss. To date, Tom Schloss does not want fire assays run-only sodium sulfide color tests.

Sampling continued, with a back-hoe trench dug across the southerly end of the Contention Dike to be able to sample the fill-gob material in the dike.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

Messrs. Briscoe, Schloss, & Dean

July 28, 1979

Sampling continues in the Contention Dike. It was decided by Tom Schloss and John Dean that Ed Rice should be trained to manage the grade control when we go into production. Therefore, he has been working with Keith on the sampling for the past week so that he is familiar with every facet that leads to grade control. RFH has spent considerable time with Ed relating to the actual sampling;objectives, technique, pit-falls, etc..

O.C. Miller and Dusty Escapule have been working on the crusher. As was explained in the July 27 Report, no reasonable small crushers have been located after very extensive search. The least expensive was $7,000 and was relatively small. Fixing up Ernie Escapules creates the problem John Dean kept focussing on-some is Ernies and some of the crusher would belong to us-who is the owner? However, there is no other alternative that is presently known, with the exception of a relatively high capital investment(+ $7000).

The dozer was brought over about noon by Charley and Bailey. The dozer work required for the sampling away from the Contention Dike and in the north portion of the Dike was worked-on till nearly dark. I was informed that the dozer must be returned early on Monday morning, greatly reducing the "test time" from one week to two days at the most. Work was scheduled for Sunday to take advantage of the dozers availability. The objective-as discussed with Tom Schloss and Dr. Dean is to facilatate the sampling by dozing off the overburden and to rip along the extension of the Contention Dike along its northerly extension-beyond the "glory hole". It was found by leveling the bottom of the northern portion of the Contention Dike that the "spalled/loose" material on the floor of the glory hole was dumped from the crest of the Dike wall;dumped from the southeast rim. Because it is relatively good grade, it is unclear why when that material was obtained from possibly sinking a small shaft, that it was brought over and dumped into the Dike. Samples taken will reveal if it is high-grade that was seggrgated and returned to the Dike instead of remaining in a waste-dump, as exist on that side of the Dike.

The large maps obtained from '71 Minerals, Tombstone Development, Newmont, Duval, and Bunker Hill were brought to Tombstone on Friday for compilation, sorting, and study. The maps have been sorted into:

1. Cross-sections; mostly along either drill-hole locations (especially the +1600 feet holes) or along proposed drill-hole locations. All drilling is being compilated into one note-book which is in the S.E.A. office and one is in Tombstone. Additional drill-hole data is about compiled and will be plotted, with the help of the aerial photographs taken by S.E.A. Photography.

2. Claim maps;TDC and State of Maine area, and some claims staked near the Gleason road northeast of Tombstone (near Holiday Estates). Included in the Tombstone Development Companies maps are their 18 unpatented claims near the Tombstone Extension(southeast of the 88 patented claims presently under lease).

3. Plan maps, showing the underground workings and surface geology as mapped by Duval and Newmont.

Aerial photographs for the TDC property have been flown, as mentioned previously. I presently have two color photos for the Contention Dike area;one to a scale of 1inch=300 feet, and one to a scale of 1 inch=100 feet. Desired would be the additional color photos:

1. For the Contention Dike area, enlarge the 1 inch=100 feet photograph to 1 inch=20 feet, so that assay results can be plotted on the accompanying overlay, and barrel-leach result. There will then be ore/waste overlays made for grade control as a result of the ore reserve study and analysis.

2. Additional photos to the above scales(1 inch=300 & 100 ft) for the Grand Central area and the Tranquillity-Empire-West Side-Toughnut areas.

There are numerous maps to the scale of 1 inch=300 feet that would provide good geological and structural information that would provide "base map" information to be checked. For example, Newmont has a surface lithology and strucure map from the Grand Central to the Toughnut Mines. The structures, especially the faults and dikes can be directly plotted on an overlay of a photo to that scale and this would facilitate field location and conformation. Also, subtle geology mapped by Newmont could also be located and checked, along with drill hole locations and the resulting sections that can be constructed from the drill-hole information(lithology and assay data).

The underground maps contain such valuable data as the location and pitch of all of the rolls-anticlines and ore-related cross structures. Underground detailed mapping is also available, especially by Newmont, but also some detailed underground traverses by Ransome and others during the active mining prior to 1910. This is all useful to compile on one set of maps.

The compilation done by the Arizona Bureau of Mines, written by B.S. Butler and Eldred Wilson contains much valuble data that should also be plotted on the overlays. I have reduced one of their maps which is to a scale of 1 inch= 600 feet by one-half in the Contention Dike area and have plotted on the photo overlay of 1 inch= 300 feet the limits of the underground workings along the limits of the Contention Dike. Even though ore-grade mineralization at present prices may extend beyond underground mine workings as known prior to 1910, it serves as a surface guide to open-pit ore because the highest-grade ore was mined at that time.

Also, aerial photographs must be printed from the 18 unpatented claim area to the southeast of the patented claims as part of our assessment obligation. That work must be planned and scheduled to comply with the filing date.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORTS

Messrs. Briscoe, Schloss, & Dean

July 29, 1979

Al Watterson called yesterday looking for work in Tombstone. He is presently in Mina, Nevada, and would like very much to come back and work for me here at Tombstone. He wants to so much that he is willing to start at $300/month, which we can pay by terminating Kieth upon Al's arrival. Because Al has extensive experience in surveying, sampling, pad and pond construction, open-pit mining(and grade control), equipment maintanence, and general leaching, it will upgrade our staff with his presence and as Tom Schloss suggested, Keith Scroggins can be re-hired for general labor when we go into production. Al Waterson will be here this coming week-end, so Keith will work one more week. After discussing this with Tom Schloss, Al was notified that we would hire him and he is moving to Tombstone.

The dozer work was started early this moring and continued untill about 11:00 o'clock, when the dozer would not start, after loosing power. Additional diesel was added, but to no avail. Lem of Modern Equipment was not available untill 2:00 o'clock in the afternoon. He said he would get a mechanic as soon as possible. However, it was not running untill the following morning, when it was picked-up by the Company that has it rented for the next month or two on a sewer job in Benson.

Learned from the use of the International TD20E, which is slightly larger than a Cat 7, was as follows:

1. It would be large enough for our production needs-compared with their next larger dozer(TD25). The price comparison on a lease-purchase basis would be over $2,000 per month for the larger dozer.

2. The TD20E can rip the surface ore/waste very effectively-without the immediate need for blasting.

Compilation of data was continued.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORTS

Messrs. Briscoe, Schloss, & Dean

July 30, 1979

Modern Equipment of Tucson picked-up their TD20E. Lem said that he would contact Tom Schloss concerning the equipment lease prices. Reported to Tom Schloss was the following:

TD25	$9,000	monthly	
TD20E	6,750	"	
FF 560	9,750	"	(front-end loader)
Truck	14,750	"	(new 50-ton)
Truck	10,365	"	(new 36-ton)
Truck	10,500	"	(used 50-ton).

Robert Cowan wants his full payment if he is going to leave his Cat6B dozer for our use-we owe him $3,000. A payment of $1,000 was to be made last week, but it was not made and Bob has carried us for a long time.

As per Tom Schloss's request, I contacted Tombstone Development and Bill Hight informed me that he was coming down to Tombstone with Frank Gallup on Wed.(Aug.1, 1979). It was not possible for me to discuss the delay of the August 1 payment, as he would elude to the payment as Tom's responsibility and would prefer to discuss that matter with Tom directly.

I had several visits with Tom Pitcher concerning getting into the '71 Minerals building on August 1. I discussed the matter with the President of the Gun Company on Sunday(July 29). He was willing for us to use the building untill they moved everything out, which he said would be very soon.

Work progressed on the crusher and shaker-screen.

The weekly budget for August follows.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE DAILY PROGRESS REPORT

MESSRS. Briscoe, Lee, & Dean

July 31, 1979

Spent most of the day talking to Tom;waiting for return calls in case Tom needed something.

Tom called Bill Hight concerning the August 1 advanced minimum royalty payment.

James Briscoe informed me that Bill Hight and Frank Gallup are stopping at S.E.A.'s office to see Jim and the office facilities.

Tom said that the Perkin-Elmer 303 would be available in three weeks. The precision-detection limits are:

Gold : ± .25 PPM
Silver: ± .06 PPM
Copper: .09 PPM.

I am sorting and inventoring the TOMBSTONE DEVELOPMENT maps to go over with James Briscoe on Thursday. Sampling progress will be presented to Jim at that time(that is also the day that Hight and Gallup will be in Tombstone). I will need some time to show them what we have been doing and our progress and future plans. It would be helpful to be able to show them color photo's of their 18 unpatented claim area as we must be doing the assessment very soon. With 18 claims or $1,800 worth of work, the photo costs must be allocated, and the remaining work planned and implemented.

I called Al Watterson and informed him of the decision not to hire him at this time, but I told him to call James Briscoe for an interview.

Sincerely,

Richard F. Hewlett

Richard F. Hewlett

TOMBSTONE

August Budget

Item	Week 1	Week 2	Week 3	Week 4
Salaries/ Wages:				
D. Escapule	$ 350	$ 350	$ 350	$ 350
E. Rice	300	300	300	300
R. Hewlett	500	500	500	500
K. Scroggins	300	300	300	300
O. Miller	300	300	300	300
Fuel:				
Chevron	338.06		300	
Diesel	150/50	50	50	50
Jeep Rental		300		
Typewriter		53		
C./L. Escapule Vacuum Pump	96.15			
Wallt Dunn	100.00			
Robert Cowan Dozer	3,000			
Back-hoe	750	50	50	50
Supplies:				
Sampling	25	25	25	25
Crushing	25	25	25	25
Drilling		250	250	250
Lab:				
Barrels	75			
Pumps	60			
Tubing	20			
Trays	80			
Storage Bottles				
Buret's				
Flasks				
Misc. Chem.	350	100	100	100
	$ 6,869.21	$2,603	$ 2,550	$ 2,250

P07 7004259

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL
(See Reverse)

SENT TO
Famco / 1700 Broadway

STREET AND NO.
22nd floor

P.O., STATE AND ZIP CODE
New York NY 10019

POSTAGE				$ .41
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE			.80 ¢
	OPTIONAL SERVICES	SPECIAL DELIVERY		¢
		RESTRICTED DELIVERY		¢
		RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	.45 ¢
			SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
			SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
			SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES				$ 1.66

POSTMARK OR DATE

SIR. Donbolie
Dan

PS Form 3800, Apr. 1976

STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE, CERTIFIED MAIL FEE, AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (see front)

1. If you want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, **leaving the receipt attached**, and present the article at a post office service window or hand it to your rural carrier. (no extra charge)
2. If you do not want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, date, detach and retain the receipt, and mail the article.
3. If you want a return receipt, write the certified-mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise, affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to the number.
4. If you want delivery restricted to the addressee, or to an authorized agent of the addressee, endorse RESTRICTED DELIVERY on the front of the article.
5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in Item 1 of Form 3811.
6. Save this receipt and present it if you make inquiry.

☆ U.S. GOVERNMENT PRINTING OFFICE 1978: 269-897

PS Form 3811, Apr. 1977

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

PM

1979

REGISTERED AUG 20 1979

SENDER: Complete items 1, 2, and 3.
Add your address in the "RETURN TO" space on reverse.

1. The following service is requested (check one).

- [X] Show to whom and date delivered ..... 45¢
- [ ] Show to whom, date, and address of delivery ..... ¢
- [ ] RESTRICTED DELIVERY
  Show to whom and date delivered ..... ¢
- [ ] RESTRICTED DELIVERY.
  Show to whom, date, and address of delivery. $____

(CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:

FAMCO
1700 Broadway/ 22nd Floor
New York, NY 10019

ARTICLE DESCRIPTION:

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	7004259	

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE [ ] Addressee [ ] Authorized agent

4. DATE OF DELIVERY 8/13

POSTMARK

NEW YORK N.Y. GRAND CENTRAL STA. AUG 14 1979

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S INITIALS

☆ GPO : 1977—O-234-337

UNITED STATES POSTAL SERVICE
OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address, and ZIP Code in the space below.

- Complete items 1, 2, and 3 on the reverse.
- Moisten gummed ends and attach to front of article if space permits. Otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.

PENALTY FOR PRIVATE USE TO AVOID PAYMENT OF POSTAGE, $300

U.S.MAIL

RETURN TO

SOUTHWESTERN EXPLORATION ASSOCIATES,

(Name of Sender)

4500 E. SPEEDWAY, SUITE 14

(Street or P.O. Box)

TUCSON, ARIZONA 85712

(City, State, and ZIP Code)

file P-418

To: Tom Schloss, Dwight Lee, FAMCO
From: James A. Briscoe
Date: August 9, 1979
RE: Daily Progess Report Tombstone Project, 8/8/79, Cochise County, Arizona

In the morning preparations were made for JAB and TEW's (Thomas E. Waldrip, Jr.) departure for Tombstone. This included gathering of equipment, maps, checks from the Accounting Department for payroll and for suppliers and subcontractors who had previously done work at Tombstone.

Five thousand dollars was confimed as having arrived from New York to the Tombstone general account that morning - transmitted by Dwight Lee at the request of JAB. An itemization of these checks was mailed 8/8/79 in the morning with the previous day's report.

As mentioned in yesterday's report, Mr. Richard F. Hewlett was terminated from project management on 8/7/79. At approximately 10:30, JAB and TEW departed for Tombstone. At approximately 12:15, JAB and TEW met Dusty Escapule and spent approximately 1/2 hour with him in the Wagon Wheel Cafe discussing RFH resignation and management change. Dusty Escapule enthusiastically received this news and indicated a willingness and enthusiasm to work with JAB and TEW. He indicated that increased cooperation from Ernie Escapule and Messers Charlie and Louie Escapule could also be expected.

A chain of command was established with FAMCO at the top flowing through JAB then to TEW then to Mr. Al Watterson and to Dusty Escapule and others who might be employed as the project progresses. It was explained that detailed time records, budget projections, cash record and short, concise, meaningful daily reports would be required.

Various aspects of the mining and metallurgical operation were discussed and after these have been more thoroughly reviewed by all parties at the site, as well as disccused with Dave Rabb and compared with the experience of the State of Maine mining operation, specific suggestions will be made.

However, briefly and most importantly on these suggestions are as follows:

1. Substantial danger may exist from open stopes below the Contention open cut. Extreme hazard may be involved in driving heavy equipment across the Glory Hole Area. At this point no one is sure how to alleviate this danger but working from the side of the cut with a long reach backhoe is probably the most viable. <u>Safety considerations must come first in this operation</u>.

2. The sides of the cut are raveling and slabby because of its echelon and parallel vein structure. This causes dangers from overhangs and falling rock of several pounds to several tons and possibly several tens of tons. A substantial rock fall could cause death or injury. The sides must be slabbed down or barred down by some method. Some work has been done with the small Ernie Escapule backhoe, but this is inadequate to the task.

3. Orientation sampling with smaller samples should be made prior to large barrel tests and still larger heap tests.

4. Mining the open cut by scraper is not appropriate because of; a) the danger of falling into an open stope in the old Contention workings; b) inability to selectively mine ore.

Dusty Escapule again indicated enthusiasm for the project and JAB reeterated that he expected complete honesty and candor in all relationships with Dusty as well as clear and concise constructive commments from him on all matters.

Dusty's truck is the only one being used at Tombstone and he indicated that he desired a formal method of compensation for its use. We agreed that $.20 per mile and $10.00 per working day would be agreeable - and I strongly recommend this be instituted immediately. Mileage is to be calcuated only on business associated mileage - not personal mileage, and records will be kept on standard S.E.A. auto mileage forms.

We then inspected the S.E.A. office/apartment at the Nellie Cashman Apartments. It is still in the process of being painted but should be ready Thursday or possibly Friday. JAB and TEW as well as other personnel involved with the project will stay at this apartment in order to keep costs down and avoid motel charges. The rent is $140.00 per month. A telephone will be installed in this apartment Friday as well as phone installation at the 71 Minerals Plant.

We then drove to the 71 Minerals Plant and inspected it and the inventory. Material has been moved from the Willet truck into the 71 Minerals Plant. The gun people are still in the plant but they must be vacated by Friday at which point we will have its complete floor space available to us. The value of this plant building is $35,000 to $40,000. Monthly rental from TDC is $180.00 per month.

We then met Al Waterson at approximately 1:30 and I reviewed with him Dick Hewlett's resignation and asked whether he had any inseperable loyalities to RFH. He explained that they were close friends but that he understood the situation and this would not interfere with his work for the Tombstone Project. He indicated a willingness and capability to work with Dusty Escapule and I explained to him the needs for close record keeping and complete candor and truthfullness in all dealings with company personnel and associated parties.

We inspected the brushing work being done by O.C. Miller and Norman Scruggin's. This is being done in order that JAB can carefully and in detail map the geology in and surrounding the Contention open cut. This work can be improved and speeded up as it is not going as rapidly as I had anticipated. On Thursday we plan on getting a pitchfork and an extra saw as well as possibly a brush hook. We also anticipate paying Miller and Scruggin's on a job basis, (piece basis) rather than hourly in order to give them some incentive to wrap up the work. I anticipate this job will take until Friday to complete but it is critical so the mapping can be done in a careful efficient manner.

The remainder of the afternoon was spent in "fence mending". JAB, TEW, DE, and AW drove to the Robert Cowan Ranch which happens to be the largest in southern Arizona, and gave him a check for $2,500.00. However, he had added up the time charts from the time clock on the bulldozer and found that we still owed him another $875.00 (see Attachment 1). I said that I would get this to him next week so that he is fully paid. He also indicated a strong willingness to work with us in the future and ~~he~~ I indicated that future transactions would be on a more formal basis with time cost estimates - informal written contacts, careful time keeping, and prompt payment for equipment useage.

We then drove back to Tombstone and stopped to visit the State of Maine mine area and the Escapule operations. We spent approximately 45 minutes talking with Louie Escapule. Charlie and Bailey Escapule had left for Tucson. Louie indicated a strong willingness to work with us under the new management situation. We inspected work that he had been doing with the new International Trackmounted hydraulic backhoe and found it to be very effective and a likely tool to use in mining operations in the Contention area. Its use would allow: a) selective mining of potential high grade streaks in the Contention ore, b) operations from a safe distance from underground workings which otherwise might result in loss of equipment and life.

Plans for Thursday, 8/9/79, were discussed with AW and DE. They will get together immediately in the early morning and itemize lists of necessary equipment, costs, and their concepts of a general operating outline. Both of these gentlemen have detailed experience with this type of operaiton and are capable of making this input. At approximately 10:00 Tom Waldrip will start working with them in order to get this equipment into a cash flow budget projection.

At 5:06 JAB and TEW left for Tucson in order to attend an AIME professional meeting and talk entitled, "Technology for Processing Low Grade Gold and Silver Ores" by George Potter, Mountain States Engineers. We arrived in Tucson at 6:39 and prepared for the meeting.

At the AIME meeting I talked with Mr. Dave Rabb regarding the situation at Tombstone and solidified our meeting for Friday morning, describing what we require of him. Mr. Potter's talk was then given. The information was quite timely and useful to our Tombstone Project and several new ideas were generated. We have a tape recording of Mr.

Potter's talk available for any interested personnel from the project or FAMCO. After the talk, I talked with Charlie and Bailey Escapule, whose equipment was featured in some of the slides. I informed Charlie of ~~the some of~~ the changes at Tombstone. He expressed great enthusiasm with working with me and expressed a desire to help in any way he could. He also expressed without my asking, his willingness to do AA assaying work for us. I also indicated that he could get delivery of a reconditioned AA unit from the middle west and if he could get an order from us he would fill out an order for four machines which should lower the cost to all parties. Approximate cost would be $2,500.00 and these machines would be delivered by air freight. I highly recommend that we take Charlie up on this. If we do not obligate for this group deal - we can do it later at a higher cost on our own. I think the AA is absolutely vital to our work in Tombstone and feel that we should take advantage of this kind offer.

James A. Brisoe

JAB/mh
P-418

№ 1455

FRONTIER EQUIPMENT COMPANY

P. O. Box 908 — Tombstone, Arizona 85638
Phone 457-3447 or 457-2283

Date Ordered ..... Completion Date 8/8/79

☐ Bid Price

Sold To: Tombstone Exploration

Materials Used | Cost

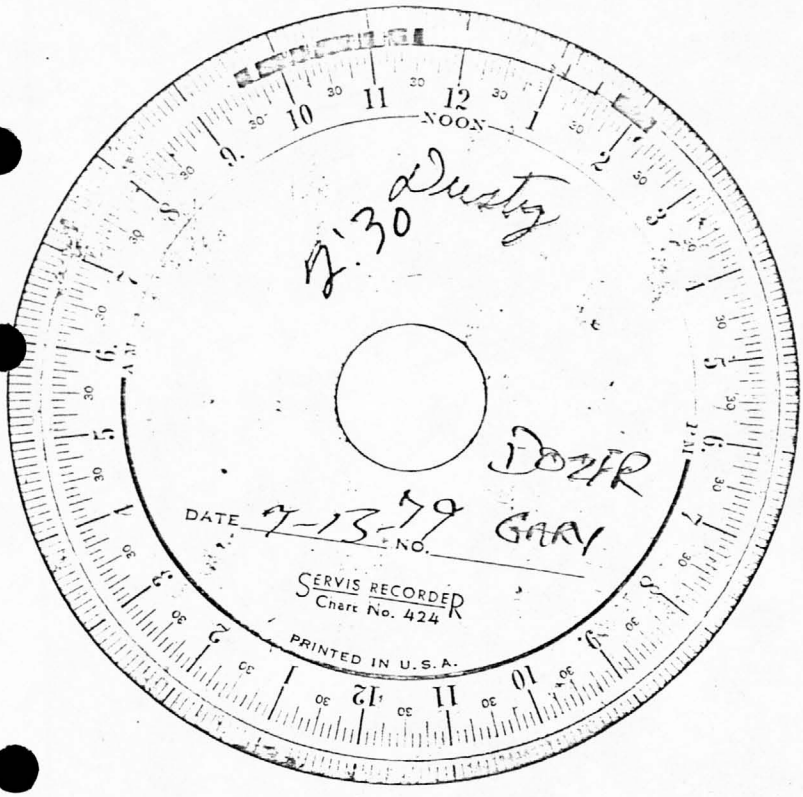
Ordered By:

DESCRIPTION OF WORK		
108 hrs at $35	Dozer	3805.00
2 hrs @ $35	Grader	70.00
	Backhoe	
	Other	$3875.00
Credit to check R.E.C. ck. # 1021		3000.00
		$875.00
	Mileage	
	TOTAL	
	Materials	
Total Materials Used	Sales Tax	
Sales Tax	Finance Charge	
	Balance Due	$875.00

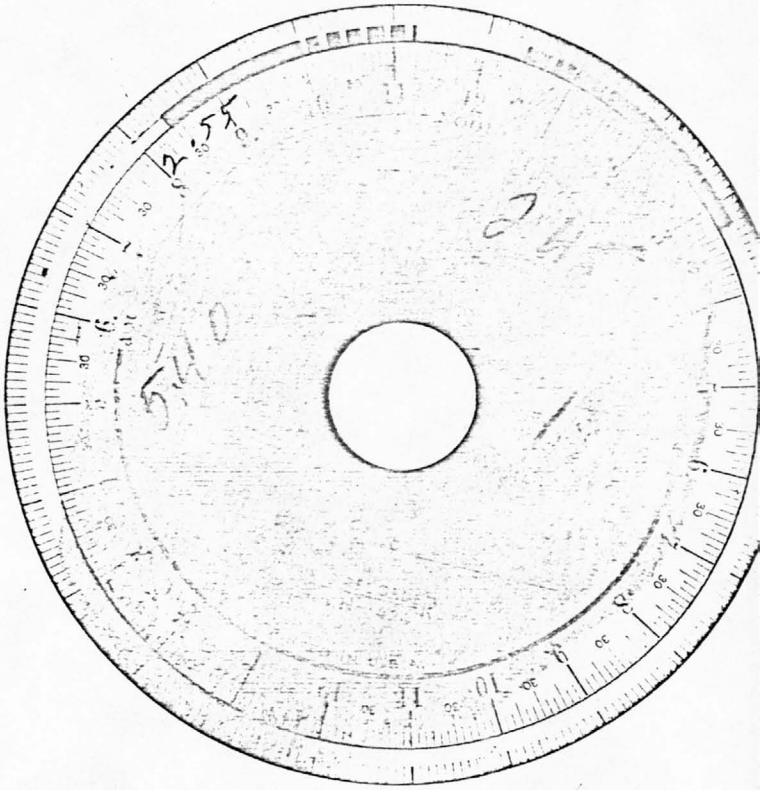
TERMS: Balance is due upon receipt of this statement and becomes delinquent if not paid by 10th of following month of completion date. Finance charge of .833 per month charged (ANNUAL PERCENTAGE RATE 10%) on unpaid balance if not paid by the 10th of the month following completion date. To avoid additional finance charge pay balance due before 10th of each month there after.

Att. 1
page 2 of 4

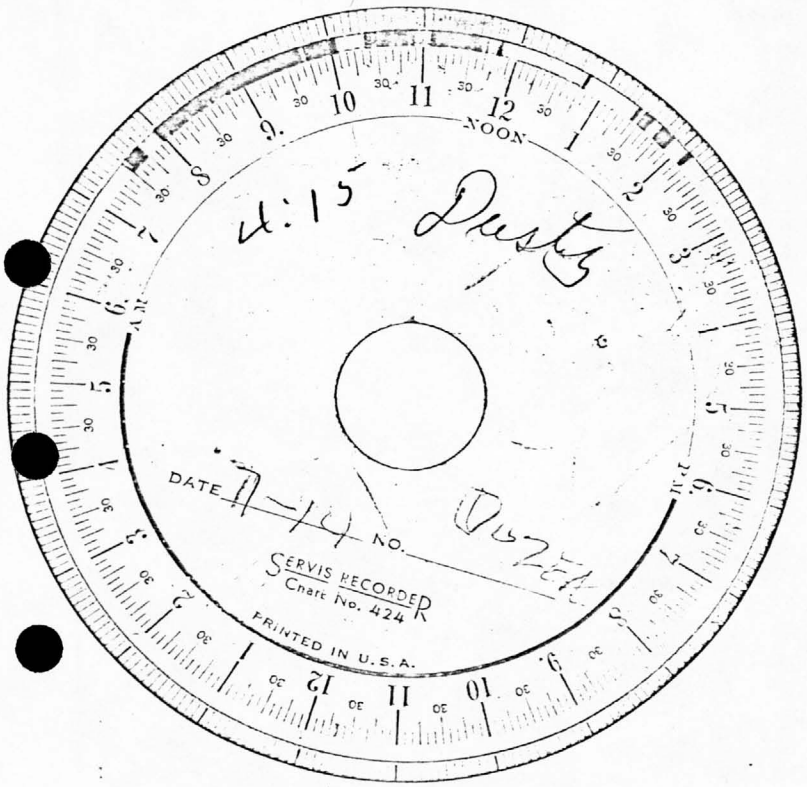
7/13/79



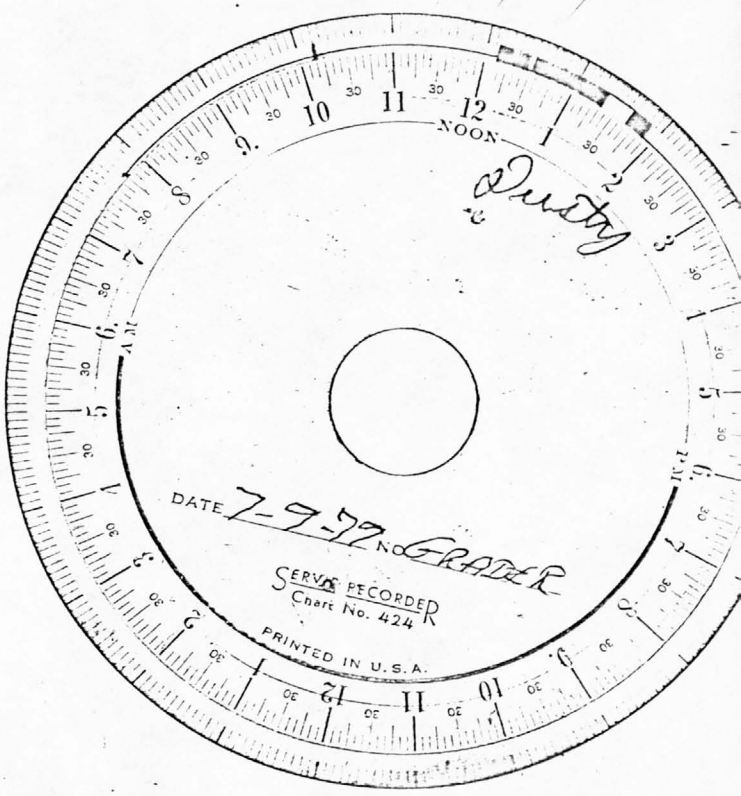
7/6/79



7/14/79

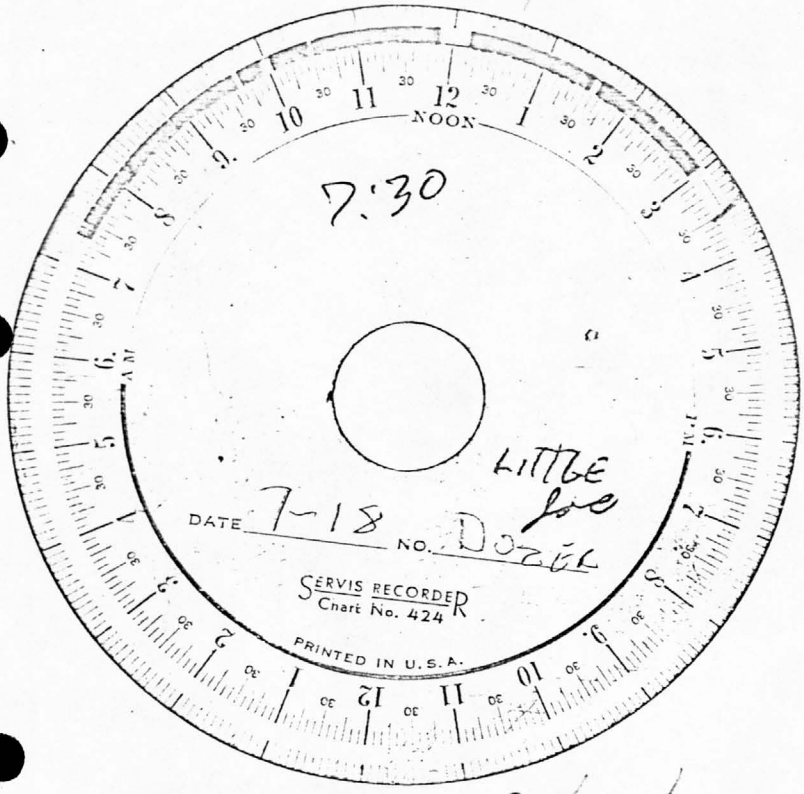


7/9/79

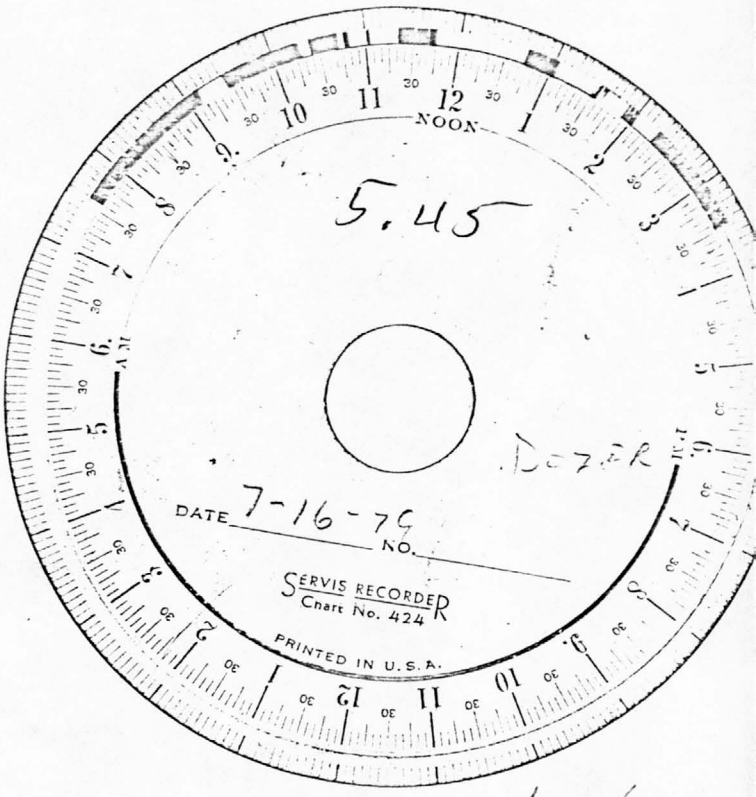


AH 1
Plane - 3 pt

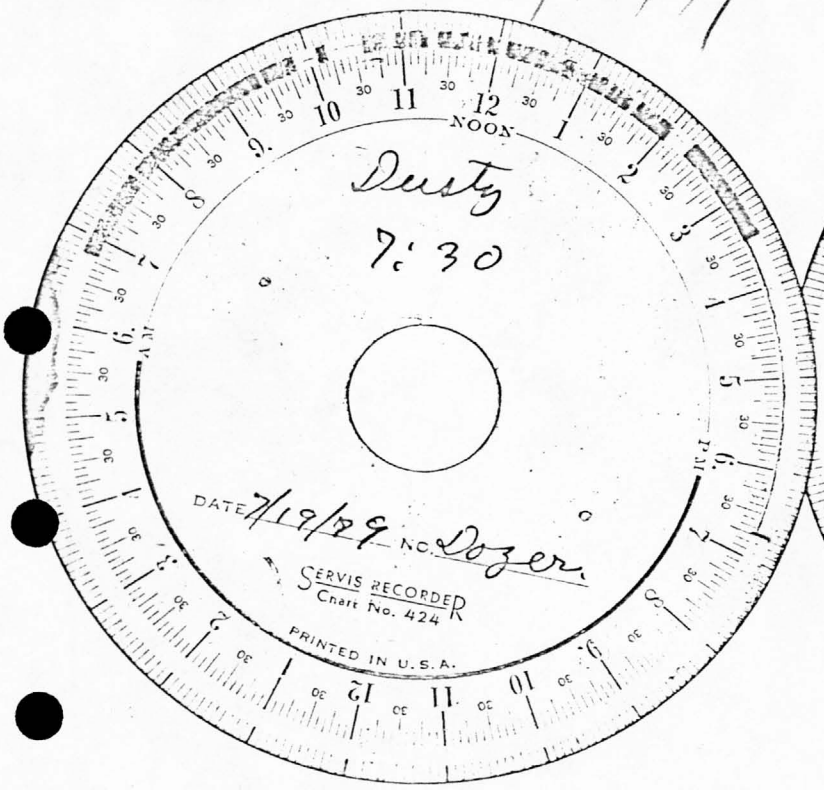
7/16/79



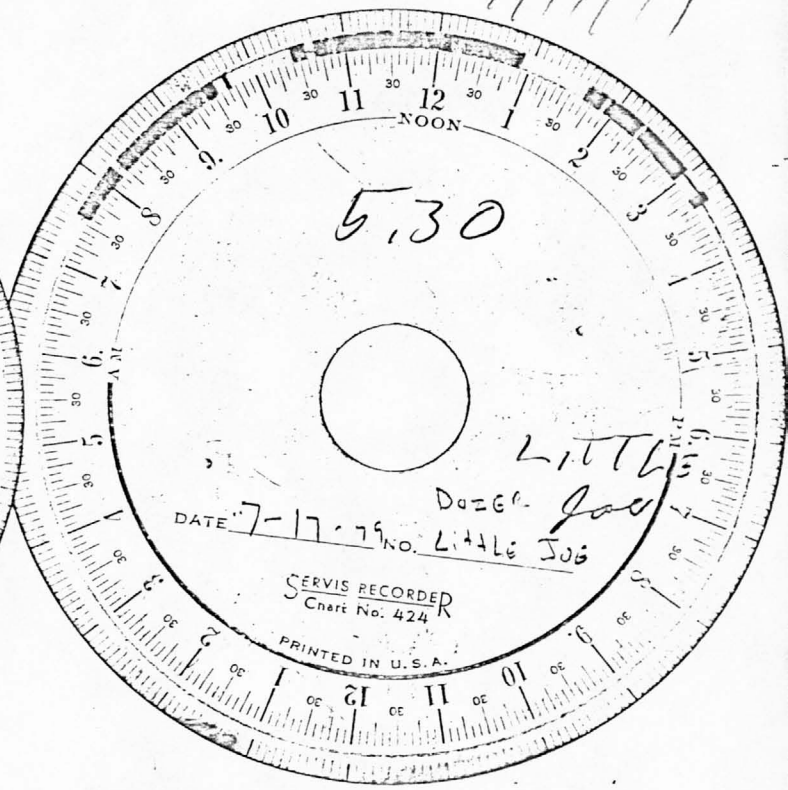
7/16/79



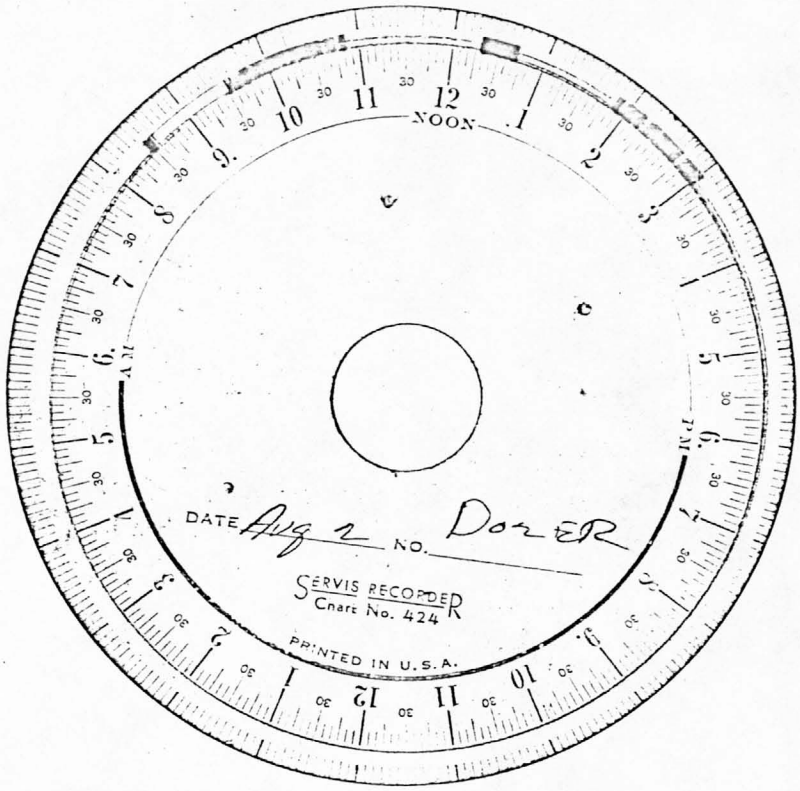
7/19/79

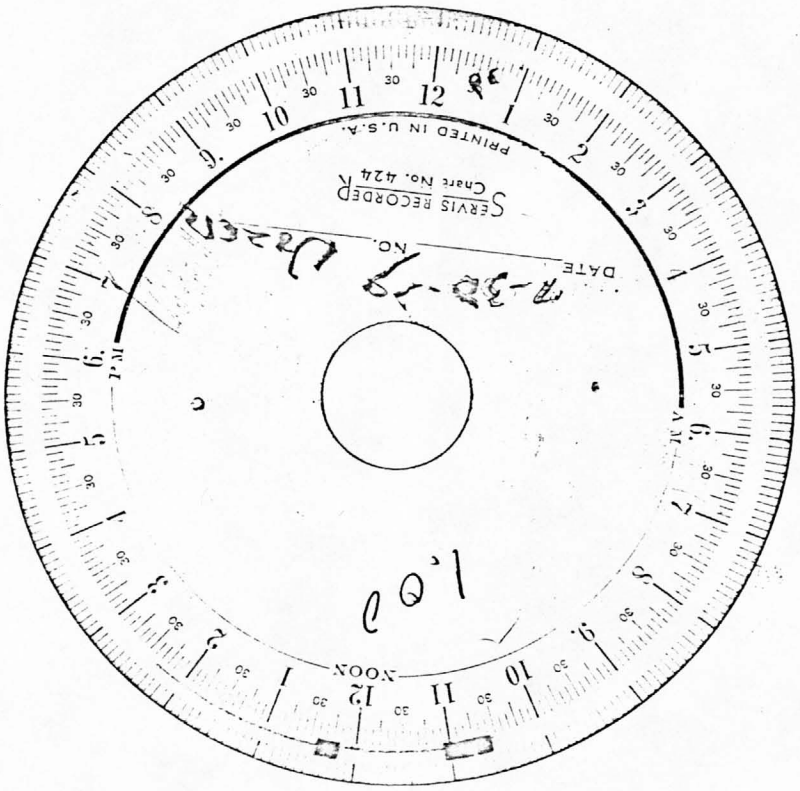


7/17/79



A-11
page 4 of 4
8/2/79





8/30/79

8-17-79

RECEIVED AUG 20 1979

Jim.

Thought you might want to put this in your file on T stone.

Thanks so much for the time you spent with Frank Gallup and I when we were in your office 1st of mo.

Hope you are getting things going the way you want.

Thanks

Bill Hight

REVIEWED
AUG 20 1979
BY JAB

FILE JAB Tombstone Site

RECEIVED AUG 20 1979

FILE

REVIEWED
AUG 20 1979
By

P. O. Box 872
Douglas, AZ 85607
April 30, 1979

William Hight
Tombstone Development Co
Box 1445
Grand Island, Nebraska 68801

Dear Mr. Hight:

As I promised I am writing to tell you that I dug at the Grand Central dump on March 5 and 6; the dig was delayed a week by equipment breakdowns. I was told while there that TDC had leased the ground about the first of the month so probably my presence there was questionable.

Six pieces were found during the dig, each containing at least one of the new tellurites/tellurates I spoke of earlier. One also contains a lead tellurite known only from Las Cruces, New Mexico previously. Although only six pieces were found, I would term the project a success, and again I want to thank you for your permission.

Sincerely,

Sidney A. Williams

SAW:bj

RECEIVED AUG 20 1979

REVIEWED
AUG 20 1979
By

4 January 1979
P.O. Box 872
Douglas AZ 85607

William Hight
Tombstone Development Co
Box 1445
Grand Island Nebraska 68801

Dear Mr. Hight:

During the course of my mineralogical studies in the Tombstone district I have found a number of new tellurium minerals in very small quantities on the remains of the dumps. As you know, most of the material has been removed by 71 minerals and destroyed by leaching operations. Last year I obtained permission from 71 minerals to spend two days digging in the few remaining waste piles with a backhoe in an effortto find more materials for study. This was partially successful, and the reprint I enclose is an example of the results of those efforts.

The reason I write is to ask permission to do a small amount of additional work on the Grand Central and Old Guard claims, again digging into the remains of certain portions of the dumps. There are several other new tellurates in these two areas but too little has been found so far to characterize them.

If you could give me this permission I would be happy to provide you with a release of liability and I assure you that the digging done would be of very minor nature, causing no damage to the property.

Sincerely,

Sidney A. Williams

SAW/s

Copy

RECEIVED AUG 20 1979

REVIEWED

AUG 20 1979

BY

Khinite, parakhinite, and dugganite, three new tellurates from Tombstone, Arizona

S. A. WILLIAMS

Reprinted from
THE AMERICAN MINERALOGIST
September-October, 1978

P-418

MEMO

TO: TEW, JAB

FROM: BMP

DATE: 8-20-79

RE: Tombstone Sampling Work of August 15-17, 1979

Work Completed

Work completed from August 15 through August 17 included geochemical sampling and radiometric surveys along the Contention Fault trench and associated cross-cuts.

A total of 58 channel samples were collected. Each sample represents 20 feet of outcrop irregardless of rock type and alteration zone variations.

A daily breakdown of samples collected is as follows:

Date	Sample #	Total
August 15	4017 - 4031	15
August 16	4011 - 4016	
	4032 - 4042	
	4044 - 4058	32
August 17	4059 - 4069	11

Samples 4017 - 4040 were collected along the east side of the Contention trench and 4041 - 4058 (excluding 4043) were collected along the west side of said trench. 4059 - 4069 were collected along various cross-cuts which intersect the northern length of the trench.

A radiometric survey was completed on August 17, 1979, along all sample sites using a Geometrics GR-101A Scintillometer. A reading was taken at 10 foot intervals - two readings per length of outcrop sampled.

Cost

Wages	Total hours	Cost
BMP @ 6.25/hr	39.6	$247.50
JDK @ 4.25/hr	39.0	165.75
TOTAL		$413.25

Equipment

1979 Blazer (203 miles @ $0.04/mile)	$81.20	
58 sample bags	58.00	
1 GR101A Scintillometer ($15/day)	45.00	
1 310 Gamma Ray spectrometer ($23/day)	69.00	
2 Backpacks ($1/day each)	6.00	
Mobile phone ($4/day)	12.00	
Rolotape ($1/day)	3.00	
Transit ($10.50/day)	31.50	
		$305.70

Expenses

BMP	$10.20	
JDK	93.09	
TOTAL		$103.29
TOTAL FIELD WORK EXPENSES		$822.24

P-418

Southwestern Exploration Associates
4500 E. SPEEDWAY, SUITE 14
TUCSON, ARIZONA 85712

(602) 795-6097

P-418 - new tellurate minerals from Contention area

FOR Mr. Dave Rabb, Mining Engineer
Ariz. Bureau of Mineral Technology
Geology Building, Room 134
University of Ariz. 85721

HOW TO USE THIS DAY/TIMER Time Saver LETTER TO SAVE TIME.

Type or write your reply in the space below. Then mail the white copy to us and keep the pink copy for your files. You'll save time and effort, and we'll have your answer much faster! Thank you.

MESSAGE

DATE 8/22/79

Dear Dave; As per our telephone conv. this am (GL #7858) please find enclosed a copy of Sid. Williams article in the Am. Mineralogist about the ~~the~~ new tellurate minerals from the Contention area, Tombstone. The deep green mineral I gave you sunday may be one of these, & if so could be of important scientific value. As Williams says these minerals are

SIGNED

REPLY

DATE

soluble in a basic solution, they may be cyanide soluble, unlike tellurides. Let me know what Bob O'Hare thinks.

Thanks for the help.

— Brian

cc FAINCD

SIGNED Dr. John Dean

Time Saver REORDER FORM No. B2419L, DAY-TIMERS, Allentown, Pa. 18001

P-418

RECEIVED AUG 31 1979

JOHN G. DEAN

401 -- 934-0060 Elmdale Road, Box 102, Route 2, North Scituate, Rhode Island 02857

Aug. 27, 1979

Memo to: J. A. Briscoe, SEA; cc: DL-THS, FAMCO.

From : J. G. Dean

Subject: Data on Tranquility, Empire and Toughnut Dumps.

Dear Jim:

I have studied with interest the extensive compilation of data on the Minerals 71 Heap material which accompanied your memo of 8/22 and, in accord with your request, will give pertinent comments.

These data are potentially valuable as a guide to our project and it would seem worth developing some detail as to how they were taken. In the meantime, I will assume that they represent fire assays on samples split and ground in accord with the Richards table. It would, of course, be very helpful to be able to relate them to cyanide leach tests with a recovery factor for heap leaching.

In order to help get a rough indication of the values in the coarse and fine fractions, the following averages were calculated:

	Silver, Toz/T	
	+1½"	-¼"
Tranquility	1.21	2.13
Empire	1.37	1.27
Toughnut	1.01	2.17

These data suggest that the fine fractions from the Tranquility and Toughnut are about twice as rich in silver as the really coarse fractions, while the values are about the same throughout the screen fractions for the Empire. Heap leaching was the right approach for these lean materials and probably was profitable.

The coarse fractions from a few areas are high in values, e.g. Tranquility 40-11, Ag 6.03oz/T in the +1½" fraction, and the Empire 41-3A, 4.70 Ag in the +3/4" portion. For the most part, however, they are around 1 oz/T. Crushing would liberate a portion of this, but does not appear of much economic potential at such a low level.

The success of the present effort would seem to depend on finding some good ore, perfecting a technique of mining mainly ore of economic interest, and of course guiding the operation through realistic and effective test techniques. Particle size must be considered in both sampling and leaching tests for cumulative progress, even if we have to use test heaps for conclusive results.

JGDean:bm

To: T.E.W.

From: J.D.K.

Subject: Rate of Ore removal by International backhoe, operated by Steve

Project:- Tombstone 418

DATE 8/30/79

It took approximately 20-25 seconds for each bucket of material to be loaded into the dump truck. The dump truck held approximately 35-40 buckets of material from the backhoe which took on the average of 17 min to load the truck each time. Taking the truck down to the pad to unload it and then back up to the site took 7 min 30 sec.

This data is the results of timing Steves rate of work on 2 occasions during the day. During the second visit to the site Steves work rate fell because Vernon Dale, the State Mine Inspector was at the mining site inspecting working and safety conditions.

J.D.K.

MEMO

TO: TEW, JAB

FROM: BMP

DATE: 8-20-79

RE: Tombstone Sampling Work of August 15-17, 1979

Work Completed

Work completed from August 15 through August 17 included geochemical sampling and radiometric surveys along the Contention Fault trench and associated cross-cuts.

A total of 58 channel samples were collected. Each sample represents 20 feet of outcrop irregardless of rock type and alteration zone variations.

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Samples 4017 - 4040 were collected along the east side of the Contention trench and 4041 - 4058 (excluding 4043) were collected along the west side of said trench. 4059 - 4069 were collected along various cross-cuts which intersect the northern length of the trench.

A radiometric survey was completed on August 17, 1979, along all sample sites using a Geometrics GR-101A Scintillometer. A reading was taken at 10 foot intervals - two readings per length of outcrop sampled.

Cost

Burden rate (base) ~~34%~~

Wages	~~8.69~~	Total hours	Cost	
BMP @ 6.25/hr		39.6	$247.50	347.12
JDK @ 4.25/hr	~~5.91~~	39.0	165.75	230.40
TOTAL			$413.25	574.52

40%

40 — off Rd should have been charged.

Equipment

1979 Blazer (203 miles @ $0.04/mile)	$81.20
58 sample bags	58.00
1 GR101A Scintillometer ($15/day)	45.00
1 310 Gamma Ray spectrometer ($23/day)	69.00
2 Backpacks ($1/day each)	6.00
Mobile phone ($4/day)	12.00
Rolotape ($1/day)	3.00
Transit ($10.50/day)	31.50
	$305.70

didn't work so can't charge

not applies

Expenses

BMP	$10.20	
JDK	93.09	
TOTAL		$103.29
TOTAL FIELD WORK EXPENSES		$822.24

DAY/TIMER Time-Saver LETTER

Southwestern Exploration Associates
4500 E. SPEEDWAY, SUITE 14
TUCSON, ARIZONA 85712
(602) 795-4097

RECEIVED SEP - 5 1979

IN REFERENCE TO:

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR Tom Weldrip.
Southwestern Expl. Assoc.
4500 E. Speedway Suite 14
Tucson ARIZ 85712

HOW TO USE THIS DAY/TIMER Time-Saver LETTER TO SAVE TIME.
Type or write your reply in the space below. Then mail the white copy to us and keep the pink copy for your files. You'll save time and effort, and we'll have your answer much faster! Thank you.

MESSAGE

FOLD DATE: 9-3-79 FOLD

9-4-79
Work done to get 65 ton a day plant going.
5:00 AM – 9:00 AM. Dusty changed 3 PVC Valves that were leaking on Pond Line, Barren Line and new mix Tank Line, These were cut valves that will have to be worked over, so they will work right. They were used in Dick H operation.

9:00 AM Dusty picked me up to start plant. Decided to put Barren sampling Valve in Barren Line So it would be easy to take Samples. Cleaned Valve on preg Sample Line.

10:00 AM Started plant Dusty Showed me start up Routine to refresh my memory. Plant operating at 10 ~~9~~ gpm 21" Vac. 10:10 Vac Pump ~~Drawing~~ water drew water from Vac Tank with preg pump. Started plant again. Probes still not working properly. Pulled probes out to see if they were coated or dirty. They were in good shape.

FOLD FOLD

BY

REPLY

DATE:

Tried plant again probes still not working properly. Worked probes manually to see if we could get them working. 12 Noon shut plant down went to lunch. 12:30 Decided to check relays. Took relays apart cleaned and filed down points. Started plant up at 2:30 PM. Probes worked off and on sometimes good. Then quit again 3:00 pm Vac pump got hot and cut off automatically due to too much water in pump. Pump motor had to cool down. Started pump up again at 4:00 pm. Still getting water in pumps probes not working. ~~4:30 pm Shut plant down for day.~~ Will see Charlie or Ernie to see if they can tell what's wrong.

Charlie and Ernie are off for Labor day weekend so will run plant Monday manually.

BY [illegible] Watson

DAY/TIMER Time-Saver LETTER

IN REFERENCE TO:

RECEIVED SEP - 5 1979

FIRST CLASS MAIL ☐ INTER-OFFICE ☐

FOR Tom Waldrip

Southwestern Explor. Assoc.
4500 E Speedway Suite 14
Tucson Ariz 85712

HOW TO USE THIS DAY/TIMER Time-Saver LETTER TO SAVE TIME.
Type or write your reply in the space below. Then mail the white copy to us and keep the pink copy for your files. You'll save time and effort, and we'll have your answer much faster! Thank you.

MESSAGE

FOLD FOLD

DATE: 9-3-79

Ran plant 6.5 hrs Had To Shut it down as I ran out of preg. I started make up water To Late. Didn't realize Depth of pond. As of 2:45 PM Today we have run 16-7 Tons Solution Through plant

Approx 25.05 oz Ag and .43 oz Au. We have Not had Late assays. So used 1.25 Ag .026 Au. per Ton Solution

Averaged 10-2 gals Solution per min while running.

We should run sprays 24 hrs / day which will require one more man. Then we can run plant 16 hrs.

As per previous we stop running plant manually we not other operator to check keep up preg pond without shutting down plant.

FOLD FOLD

BY E W Cal. Matthews

REPLY

DATE:

BY

DAY/TIMER Time-Saver® REORDER FORM No. B2420L, DAY-TIMERS, Allentown, Pa. 18001

P-418 File

TO: FAMCO
Mssrs. Tom Schloss and Dwight Lee

FROM: Prepared for Program Manager, J. A. Briscoe, by T. E. Waldrip, Jr., Project Manager, Southwestern Exploration Asociates, Inc.

DATE: Tuesday, September 4, 1979

SUBJECT: Project 418 - Tombstone Project Daily Reports for Week ending August 17, 1979

Thursday, August 16, 1979

Tombstone:

Work continued on collecting channel samples as per memo of JAB's for 8/15/79 by BMP and JDK on the Contention open cut area. See memo by BMP dated 8/20/79.

Drift (along strike of Contention dike and vein system) backhoe trench was cut for a length of 125 feet long by approximately 3 to 4 feet deep on the northeastern portion of the Contention dike extention area towards the ~~Bummer~~ Boom Shaft -- Old Contention pump shaft (?) -- using the rented Escapule backhoe. DE continued D-6-B dozer work, moving overburden from the eastern Contention dike area to facilitate mining, backhoe trenching, and ore removal. Road and ground improvement was made using Robert Cowan road grader.

Tucson:

TEW continued all day to run down materials for safety, improvements, barrel tests, lab set-up, and leaching operation. Cost estimates and purchase orders were also written.

General Comments:

Availability of needed materials at local merchants is a major problem, although we are gradually overcoming this obstacle. Mining tests were postponed by one week in order to get a better idea of ore tenor and problem at the State of Maine operation as discussed by JAB August 15, 1979.

REVIEWED
SEP 6 1979
By_____

Friday, August 17, 1979

Tombstone:

Work continued on sample collection and geophysical survey of Contention dike area (see memo of BMP dated 8/20/79). Samples were collected along the newly excavated backhoe trench to the northeast of the open cut by BMP and JDK. Backhoe work of previous days had uncovered an extention of the vein system roughtly aligned with the Contention open cut area. This zone was composed of breccia fragments of highly-altered Bisbee Group sediments and dike rock in a matrix of very friable alunitic clays and decomposed wall rock. Evidence indicates one, and possibly more, parallel-to-subparallel veins exist in the area. The radiometric survey was run across the area to determine if structures, veins, or rock types had any significant radiometric values. This could prove to be an extremely useful and economic tool for mapping and ore control but, as yet, data collected has not been fully interpreted or evaluated for usefullness and applicability for use on this project. AW and DE continue grounds clean-up, moving of equipment, International excavator from State of Maine operation and 71 Mineral building maintenance. BMP and JDK return to Tucson.

Tucson:

TEW continued to gather remainder of supplies for barrel test. Left for Tombstone, with gathered supplies at 2:00 P.M. Arrived at 4:00 P.M. Proceeded to unload supplies, checked work done to date and began set-up for barrel test. JAB remained in office for return to project site next morning.

REVIEWED
SEP 6 1979
By_____

TO: FAMCO
Mssrs. Tom Schloss and Dwight Lee

FROM: Prepared for Program Manager J. A. Briscoe by Project Manager T. E. Waldrip, Jr., Southwestern Exploration Associates, Inc.

DATE: Wednesday, September 5, 1979

SUBJECT: Project 418 - Tombstone Project Daily Reports for week ending August 24th, 1979

Saturday, August 18, 1979

Tombstone:

AW & TEW spent major part of day organizing and constructing 16 barrel test units, to begin running samples to be gathered during the first part of the week. Several people, including members of the State of Maine operation, reviewed our set-up and were impressed with the quality of thought going into our barrel test operation set-up. They inquired about where we had come up with such quality materials at such a low price (material cost of $15/per barrel test unit). DE & TEW reviewed work to be done with rented International backhoe (excavation). We decided to clean up the eastern edge of the Contention cut in order to make it safer to operate the excavator in and near the edge of the open cut. This was necessitated by the fact that four feet of soil (overburden) was still located with 20 feet of the cut edge, making sluffing of material into open trenches and cut a safety problem. With the Cat D-G-B, dozing had to be kept to a safe distance, due to the fractured nature of the cut edge and to potential sluffing conditions present. Four and one-half hours were spent removing approximately 50 tons of material from the edge of the cut and in making this particular part of the operation much safer. Escapule's front end loader was later used to stockpile rock coming from the operation, should it prove to have leachable values. DE spent remainder of day on excavator, trenching an approximate 50 feet by an average of 8' deep trench normal to the strike of the open cut on its southeastern side, approximately 30 feet northeast of the waste dump near the crest of the small hill (old Contention inclined shaft [?]). JAB arrived from Tucson at approximately 3:30 P.M. All involved reviewed progress, work schedules, and potential ideas for development work.

REVIEWED

SEP 6 1979

By_____

Sunday, August 19, 1979

Tombstone:

Short review of work to be accomplished. AW worked on finishing of the barrel testing units, and cleaning, organizing lab ware and general building. Makeshift door put in where hole was cut in building wall. DE worked on International backhoe (excavator) digging four trenches at the far northeastern portion of the open cut. Two trenches cross cut Contention vein system; one was to the northeastern side into an old adit and also extending it into the hanging wall side of the veins; one cut paralleled the vein system and connected the two trenches mentioned above. JAB and TEW reviewed operation of excavator throughout the day, collecting samples and observing various rock types encountered during excavating.

Dave Rabb drove down from Tucson to review progress, and went over our barrel test set-ups. We reviewed solution strengths and various lab techniques which were incorporated into our plans, as well as length of times to have barrel test on in order to get accurate estimates of ore tenor and leaching conditions.

General Comments:

International backhoe (excavator) has been not only an extremely cost-effective way of obtaining pertinent data necessary to correctly evaluate potential ore reserves in the Contention open cut area, but also as a safe and efficient way of opening dangerous open stoped areas and ground of questionable nature. With this machine, surface mining is applicable and should be investigated for all areas within 50 feet of the surface (using benches), and quite possibly to even greater depth should conditions warrant. We are extremely appreciative to the Escapule's and State of Maine Mine operation for allowing us to use this and other equipment, plus all the free advice, and help so graciously given. This family has literally been going out of their way on certain occasions to see that we are supplied with machinery on time, assay results, etc.; they are to be considered one of our greatest assets in the area, making a marked change for conditions existing heretofore.

Geology in Trenches:

Trenches crosscutting vein system -- veins in a zone approximately 12 to 15 feet wide contain breccia and fault gouge. Extreme alunitic alteration is found in both the veins and breccia fillings throughout the zone. Minor residual iron oxides are found in major veins which may run up to five inches in

REVIEWED
SEP 6 1979
By JMB

width, pinching and swelling throughout the exposure. Minor massive quartz veins contain pockets of cerussite, which should run relatively high in Ag and Au if past production records are indicative of where and how ore occurs. Several drifts, stopes or adits were uncovered during trench excavation which have been back-filled with "gob" or dump material, and should also have leachable values present. Outside the veins, the wall rock is very hard and confident, suggesting little alteration, save for possible silicification, of the original Bisbee Group sediments.

It was decided to continue work through the week without taking off Monday and Tuesday as originally planned. TEW and JAB returned to Tucson Sunday evening.

Monday, August 20, 1979

Tombstone:

International excavator and front end loader were returned to State of Maine operation by DE and AL. Barrel test procedures were reviewed with Louie and Charlie Escapule. Returned to operation and collected seven barrel samples from various trenches and dumps. (See Barrel Test Leach Data Sheets B-1 through B-7) Tests were set up and began at 1:00 P.M. Rest of afternoon was spent trying to get caught up on paperwork and locating Ernie Escapule, whose ppt. plant we were to use (found not to be in town [Tombstone]).

Tucson:

TEW and JAB worked on getting expense account ledgers together and ordering additional supplies and chemicals.

Tuesday, August 21, 1979

Tombstone:

DE and AW picked up Ernie Escapule's ppt. plant and brought it to the site. Spent remainder of day getting plant cleaned up and in running order and collecting samples for barrel tests, in addition to cleaning up lab glass ware, getting samples assayed, and catching up on paperwork.

Tucson:

JAB and TEW completed expense accounting, and began picking up needed supplies.

REVIEWED
SEP 6 1979
By

Wednesday, August 22, 1979

Tombstone:

DE and AW worked on collecting an additional 9 samples from previous materials stockpiled on test leach pad, and from trenching operation performed on Sunday, August 19, 1979. (See Barrel Test Leach Data Sheets B-8 through B-16). Cleaned out old barrel tests started on Monday, August 20, 1979. Set ppt. plant up, collected and work on previous sample data.

Tucson:

TEW, JCB, JDK, and JAB finished getting supplies packed and traveled to Tombstone. Unloaded supplies and began work on 14 additional barrel test set-up. JAB arrived around 3:30 P.M., reviewed progress and made evaluation that present time schedule is approximately three days behind schedule.

Thursday, August 23, 1979

Tombstone:

DE and AW moved ppt. plant into 71 Minerals building and set-up again for more security and better working conditions. DE used Cat D-6-B to doze out cross cut sample area near old Contention (~~Bummer~~ Boom) pump shaft. TEW, JAB, JDK, and JCB cleaned up cut brush and burned it along trend of Contention dike. All began collecting drift and cross cut samples in late morning along collapsed zone. Continued sample collection for remainder of afternoon on all areas of outcropping rock in area of mined out rock. JDK and JCB measured all sample intervals collected, and JAB and TEW began collecting barrel test samples on zones cross cutting vein structures in trench dug during Sunday, August 19, 1979. Steve Henderson began moving ore to leach pad from old inclined Contention shaft, using Escapule front-end loader and his truck. Steve worked from approximately 10:00 A.M. until 1:00 P.M. when he had to work on another job for the City of Tombstone. Approximately 150 tons or ore were moved during the day's mining activity.

Friday, August 24, 1979

Tombstone:

Steve Henderson and helper continued to move ore from old Contention dump to test leach heap. Throughout the day approximately 2/3 of the dump was removed and trucked to the leach pad, accounting for approximately 280 tons of material moved during the day. Approximately four truck loads of material were moved each hour, accounting for 50 to 60 tons. Assuming 50 tons, the actual direct cost for moving the material amounted to $0.50/ton truck and driver and $0.30/ton front-end laoder rental

REVIEWED
SEP 6 1979
By

for a total of $0.80/ton ore moved. This would seem to indicate that easily accessible waste rock containing as little as 0.5 oz. leachable Ag may be worthwhile as a feed stock in the initial operation to generate sufficient exploration cash flow and time to delineate additional higher grade ore reserves.

DE and AW continued work setting-up plant and getting things operational for leaching to begin during the next week. Plant was cleaned, connection and pipe ordered, main water lines connected, and water tanks moved. As always, continued barrel tests were sampled and results sent to be assayed. JAB, JCB, JDK and TEW continued sampling materials from trenches, dozer cuts, and finishing up work from the day before. Samples were collected for both shaker tests and barrel test. Eighteen barrel test samples were collected, along with 25 channel, drift and cross cut samples, during the two day period. JAB left for Tucson at 12:30 P.M.

REVIEWED
SEP 6 1979
By FMB

File

To: FAMCO
Mssrs. Tom Schloss and Dwight Lee

From: Prepared for Program Manager, J. A. Briscoe
by Project Manager T. E. Waldrip, Jr.
Southwestern Exploration Associates, Inc.

Date: Wednesday, September 5, 1979

Re: Project 418, Tombstone Project Daily Reports
for Week Ending August 31, 1979

Saturday, August 25, 1979

DE, AW, TEW, JCB, & JDK began work on setting up and running P.V.C. pipe to ppt. plant & makeup tank and connecting of water lines. Old solution in pregnant solution pond was tested and found not to contain values; water was pumped out of pond in anticipation of its use during leaching tests during the next week's operation. Steve Henderson continued removing old dump ore to the leach pad, removing the remainder of the dump. Approximately 150 tons of material was moved during this day's operation, amounting to about 600 total tons of material moved during the three-day mining operation. This, plus an additional 300 estimated tons already on the pad, constitutes our 900 ton leach test to be run using Ernie Escapule's ppt. plant. Barrel test indicates much of this ore should contain at least an estimated one troy ounce leachable silver content, and average estimated gold content of in the range of 4 to 5 dollar value. Assuming ideal conditions during leaching, we should expect our recovered concentrates to be valued in the range of $10,000 to $12,000 for this 900 ton test.

Work continued in the afternoon using the International backhoe excavator (after pickup from the State of Maine operation) to run actual mining tests to stockpile ore from the edge of the open cut and to extend sample trenches and delineate additional ore reserves to be mined in the near future. Approximately 25 tons of material was mined and stockpiled by Steve Henderson during a 2.5 hour period in the afternoon. Sample sites were delineated for the next day's trenching operation along the southeastern edge of the contention open cut. JAB arrived on site about 10:30 a.m., reviewed progress and work schedules. TEW, JCB, and JDK constructed additional barrel test bench during early afternoon.

Sunday, August 26, 1979

TEW, JCB, JDK, AW, & DE continued work on water lines and piping system to ppt plant. Cyanide mixing tank was purchased, and piping was connected. AW & DE took afternoon off. TEW, JCB, JDK continued by getting sprinkler lines together and found enough used P.V.C. pipe to string another effluent line from the leach pad to the pregnant pond.

Steve Henderson worked with JAB on additional trenching operation to open additional barrel test sample collection sites. This continued through late afternoon. JAB returned to Tucson.

Monday, August 27, 1979

TEW worked on gathering piping supplies needed for additional work on spray lines and various tank hookups. JCB and DE tested water lines to plant. AW worked on sampling barrel tests, getting assay results back, and doing paperwork. Vernon Dale visited mining operation; discussed progress on safety conditions, dust and noise levels. Steve Henderson was working on International excavator, making mining test of high grade area wall rock and loading it on separate area of leach pad. Approximately 160 tons were moved during the day (see memo from JDK, 8/30/79). Cleaned up plant and made safety improvements for anticipated return of Vernon Dale to plant site. He returned, but only to check dust levels at the mining site.

Tuesday, August 28, 1979

Work continued on piping setup; all work was completed and ready to start spray operation the next day. Poor weather (wind) during p.m. so could not run sprinklers. Did odd jobs and posted safety signs on cyanide tanks in anticipation of visit by MSHA people. Visited with Tom Pitcher and tried to get unpatented claim matters taken care of. He did not have copies of claim notices, so TEW will have to go to Bisbee to get them prior to mid-September. Also spoke about land east of large heap and cyanide drums which Carl Nelson was picking up. T.D.C. will try trade of ground with current owner of land since it would be an ideal area for leach pad. TEW, JCB, JDK returned to Tucson.

Wednesday, August 29, 1979

Tombstone:

DE & AW continued work on getting the ppt. plant operational, and began spraying the test heap with cyanide solution. Had problems with weather (wind) and had to shut down before effluent was returned. Ran assay of barrel tests to State of Maine operation for assay and cleaned up paperwork related to barrel test samples. Return collection gate installed on leach pad.

Tucson:

JAB & TEW began expense and time accounting for prior three week period. Finished gathering information on purchase of chemicals needed for operation, and went through accounting process to get money. Prepared JDK for trip to Tombstone the following day.

Thursday, August 30, 1979

Tombstone:

Minor problems with water system; fixed. Four foot effluent line connected with main pad effluent line to pregnant pond. Continued work on sample collection and paperwork. Cleaned lab ware. Had to shut down sprinkler early due to weather and no one available to watch operation during p.m. hours. JDK delivered supplies (cyanide, sodium hydroxide) to site and picked up additional items needed back in Tucson. Returned to office.

Tucson:

Work continued on getting expenses together and times accounted. Billings were checked.

Friday, August 31, 1979

Tombstone:

DE & AW completed work on ppt. plant and continued spraying to build pregnant pond to begin ppt. operation the next day. Samples were collected and assayed. Paperwork was continued and caught up, anticipating continuous 16 hour operation of ppt. plant.

Tucson:

Finalized expenses and timesheets. Reports, graphs, and additional paperwork was begun.

TEW:cmd
P-418

REVIEWED

SEP 6 1979

By HB

BARREL TESTING PROCEDURES

1. Collect Representative Samples - This is generally a channel sample collected normal to dip of structure, alteration, bedding, or rock type, if determinable. In some cases, grab samples are collected from dumps or high grade areas, such as veins or when loading samples on the heap leach. In all cases, a representative sample is desirable. All workers have been instructed on proper sampling procedures, and all are under direction of an experienced geologist or sampler.

2. Representative Samples of this material are bagged and sent to be run by shaker testing, generally in amounts of 5 to 10 lbs. In addition, representative samples are bagged for on-site reference and comparison if necessary.

3. Various samples are also selected, at random, to be sent in for fire assay to determine actual contained metal values and as a check for percentage recovery during leaching.

4. Barrel test sample weighed to 50 lbs.

5. Ten liters of water is added, using actual water to be used during leach operation.

6. Alloquats of pre-made cyanide and sodium hydroxide added to bring final solution strength to approximately two lbs. free cyanide per calculated ton of solution, and to raise pH to around 11.

7. Barrel testing started.

8. Sample collected for analysis on 6, (12 or 18), 24, & 48 hour intervals and longer, if necessary.

9. Samples filtered and put into glass pyrex jars for immediate anaylsis on A.A. unit.

10. Alloquats taken as each sample interval is drawn off and tritrated with KI to determine concentration of free cyanide still left in solution.

11. pH test continually run to make sure that pH remains around 11 or higher.

12. Additional cyanide and sodium hydroxide added to bring cyanide up to plus 1 lb. per ton of solution and pH back to near 11 after each sample interval.

13. Charts are kept on each barrel test onto which assay data, weights and amounts of material, are added, plus all titration data and a calculation of actual metal values leached from each ton rock on a ratio basis.

copy this page for Tom

MATERIALS ~~Sha~~ Sent to Messrs Tom Schloss & John Dean on Sept 6, 1979.

+ Daily Reports by TEW Aug 16th through Aug 31st 1979 and A.W Sept. 1 through 3rd, 1979

+ Calculated ore values - J.A.B memo.

+ Barrel Test Procedures - TEW memo.

+ Color Aerial Photo prints of Contention Open Cut 1" = 20" scale.

+ Sepia Overlay of channel assay values along walls of Contention Open Cut for photo at scale 1" = 20' scale for Ag & Au values calculate As ~~preside~~ presence day values $9 Ag $300 Au.

+ 3 plan maps of Contention Mine Workings 1st through 8th levels.

p. 418

RECEIVED SEP 21 1979

Sept 20, 1979

Screening and Crushing
of 71 minerals Heap.

Excavator will make 4 ditch cuts on Area #1 of Heap. Samples will be Taken at 10' and 20' Depths.

A 50# Barrel Test will be made of each Screening Size.

1 - 1½"
2 - 1"
3 - ¾"
4 - ½"
5 - ¼"
6 - ¼" minus.
7 - Pit run.

Total 4 ditches x 7 = 28 Barrel Test @ 10' Depth.
Total 4 Ditches x 7 = 28 Barrel Test @ 20' Depth.
56 Barrel Test.

These Barrel Tests will show us 2 major Answers.
1 - How fine an ore can be, and still percolate.
2 - If it is Economically possible To Leach Each Size.

Depending on the above answers a selective crushing program Can be Developed on Sizes To be Crushed and put on pad.

Crushing Test Should Start with a 1½" minus crushing sizes, and crush the oversize Screenings plus the 1½" - 1" - ¾" all in one unit.

The reason for Crushing These sizes all at once on a 1½" minus Crush, is that we Keep the crusher jaws at Least ¾ full, Therefore we will crush a portion of the smaller material which will open up more surface area.

Then Barrel Test The crushed material.

Take the remainder and screen out the ¾" minus. Barrel Test what was retained on Screen.

Then attempt Barrel Test of fines.

We will Know much better what sizes To crush after we obtain answers to the above.

Test Heaps will have to be run to determine actual recovery.

Then a standard Crushing procedure can be determined for Areas #1, 2, 3 on main 71 mineral heap.

E.W. Walton

Barrel Test Samplings (1974)

BARREL TEST SAMPLING

Purpose of Barrel Test Sampling:

1. Percolation of ore to be leached.
2. Consumption of reagents.
3. A-A Assay of solution = Oz. per ton solution.
4. Reduced to Oz of metal per ton ore.

@ Net weight of solution - by dry weight of ore = ratio X A.A. assay solution = Oz. per ton ore.

Procedure:

50# ore Barrel Test

Bring in approximately 150 - 200# of sample. Split down sample, take 1/2 of split, weigh out 50#.

Note: On backhoe cuts when samples are taken at time of cutting ditch, normal moisture will be considered dry weight of ore. This situation could be corrected by drying small sample of all ore to determine actual dry weight of ore, but it is time consuming and expensive. If samples of cuts are taken at a later time and rains or high humidity has been in effect, then samples should be dried and moisture content figured.

When samples are taken at time of digging cut; at least one sample should be dried to determine average moisture content.

This average moisture content shall be considered in tare weight of samples.

When 50# dry ore has been determined then:

11 liters of West Side water will be added to Barrel Test system with 11 grams of NACN, which will equal 1/ 1 lb. NACN per ton of ore and approximately 2.2 to 2.5 lbs. NACN per ton of solution. This determined by NACN Titration. Before introduction of NACN to 11 liters of solution, approximately 6 grams of NAOH should be added and PH checked.

Dry weight of ore, tare weight, amount of solution and reagents added and starting time should be duly recorded.

Note: From time of starting Barrel Test to the end of test, solution assays may be taken at any interval of hours depending on procedure set-up.

Every time a solution assay is taken it is of extreme importance that complete BarrelTest weight is taken. Subtract weight of apparatus, (tare), and weight of dry ore which will give weight of solution remaining. Weight of solution remaining (net weight minus ore) = weight of solution. Weight of solution divided by dry weight of ore will give ratio number. Ratio number X A-A solution assay Oz per ton of solution will - Oz per ton ore.

NACN & NAOH Titration of samples xxxxx extracted will be taken and PH of solution. All duly recorded. From original NACN & NAOH lbs per ton of ore titration will indicate amount of reagents used in X number hours per ton. If tests are to continue for more hours, addition of NACN or NAOH may be necessary otherwise solution will possibly reprecipitate.

Any Barrel Test tested more than 24 hours will have to have solution added due to evaporation and retention in ore.

When adding solution to Barrel Test, first the NACN titration should be double checked and NACN % added to solution to bring solution up to 1 lb per ton of solution which is approximately 1/2 original solution titration. Therefore liquid and weight measurements should be made accurately.

As long as solution is accurate as per % of NACN any amount may be added, since net weight of solution will determine actual assay.

Besides running out of solution, the most important reasons for adding to it and the amount added ~~is~~ are:

1. Continuous recirculation.
2. If solution gets to low on richer ores A-A will peak therefore requiring dilution of assays which reduces accuracy of A-A assay.

Note: All over time of Barrel Test should be set at a reasonable time, 24 - 48 hours. Suggest 24 hours which will prove in 24 hours amount of ore that can be leached in that time which will show whether ore is/~~economically~~/feasible to leach. It does not tell the
/economically/
total amount that can be leached.

Periodical extended leaches of Barrel Test will give a % rate against a 24 hour leach.

Note:

At this time I am reportingon pit run ore which, in the Tombstone area, approximately 30 to 35% of the silver will be extracted. Approximately 55% of the gold will be ~~mix~~ extracted.

No test on TDC property ore have been made on sieve analysis and crushing to my knowledge.

At the time of this report we are planning on a complete sieve analysis and crushing test program on main 71 Minerals heap and open pit potential.

Resume':

In heap leaching ~~it~~ is mandatory to set up a definite time, amount (tons) and reagent %'s in Barrel Test. Long term test, larger test and various reagent %'s can be tested to create a % figure between constant test and ultimate test, therefore creating a proporation and ratio between reality and actuality.

Heap leaching is not a true science and regardless of percentages achieved; the cost of operations against the materials produced shows either profit or loss. If a profit can be made with a low percentage recovery then it is economically plausible to go ahead with limited production and take time to improve recovery; through re-leaching, crushing and screening or pit run leached ores.

Professional advice would be welcome.

TECHNICAL INFORMATION ON 50# BARREL TEST

Titration of NACN:

STANDARD SILVER NITRATE SOLUTION. ($AgNO_3$)

8.67 grams $AgNO_3$ per liter of distilled water.
Then 1 ml. is equivalent to 1 pound of cyanide when a 10 ml solution sample is taken for titration.

Two or three drops of 10% Potassium Iodide may be added to aid in determining the end point.

Titration of NAOH

TITRATING TO DETERMINE ALKALINITY IN TERMS OF NaOH (caustic soda)

If3.937 grams of Oxalic acid crystals be dissolved and made up to liter with distilledwater, then taking 25 cc sample, the number of cc of standard acid used times 0.01% free alkali in terms of NaOH, or time 0.2 equals it's equivalent in pounds of NaOH per ton of solution.

BARREL TEST SOLUTION

$$\frac{50\#\ \text{ORE WT.}}{2000\ \text{lbs.}} \times 454 \text{ grams NACN} = 1 \text{ lb NACN per ton ore.}$$

$$\frac{2000}{\text{Ore wt. } 50\ \#} \div \frac{454}{40} = 11.35$$

E W Watterson

REVIEWED

SEP 6 1979

By HB

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Barrel Test Leach Data

BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

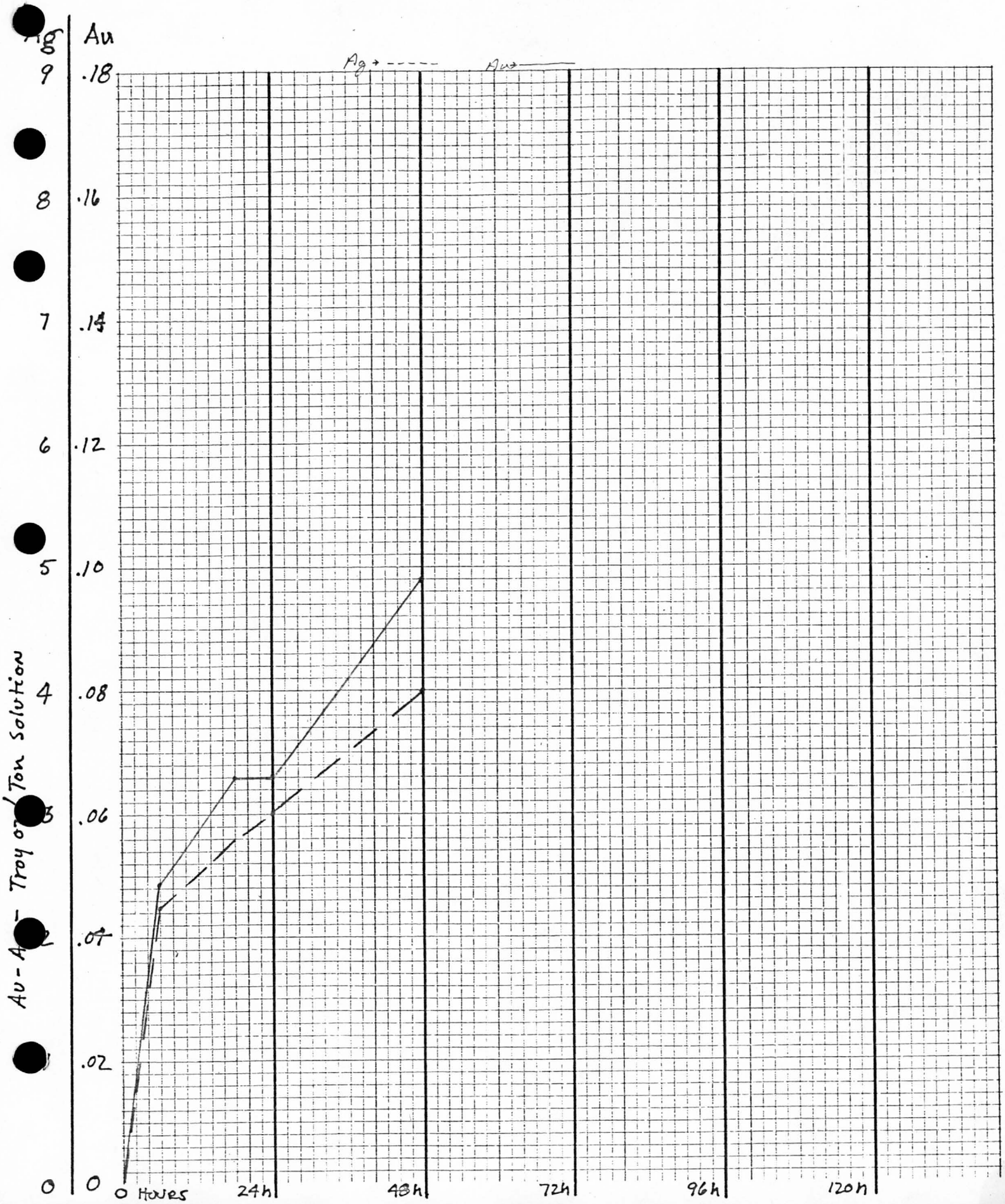
Sample Identification B-1 Wet Wt. 66.0 (24hr) 62.5 (48hr) %H_2O Dry Wt. 50

Start 1:00pm Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.049	2.24				1.1		11			.9	
18		.066	2.80				.8		10			1.2	
24	16.0	.066	3.00	.32	.021	.96	.4		9	6 grams	2 Grams	1.6	
48	12.5	.098	4.00	.25	.024	1.0	1.7		12			0.3	

STARTING DATE: 8/20/79 1:00 PM

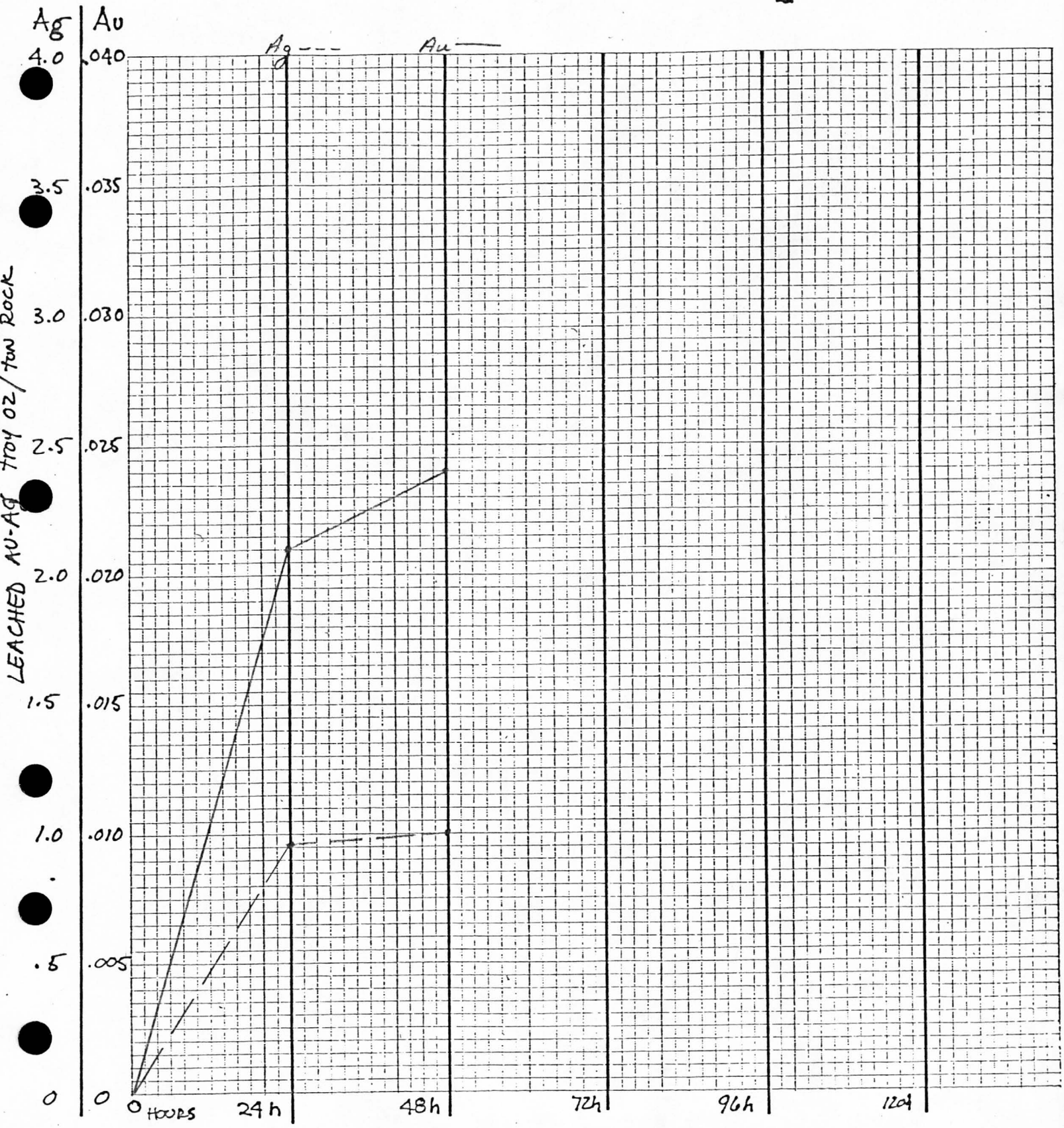
BARREL TEST SAMPLE # B-1 P-418



BARREL TEST

STARTING DATE: 8/20/79

SAMPLE # B-1



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-2 Wet Wt. 67.75 (24hrs) 64.5 (48hrs) %H_2O Dry Wt. 50

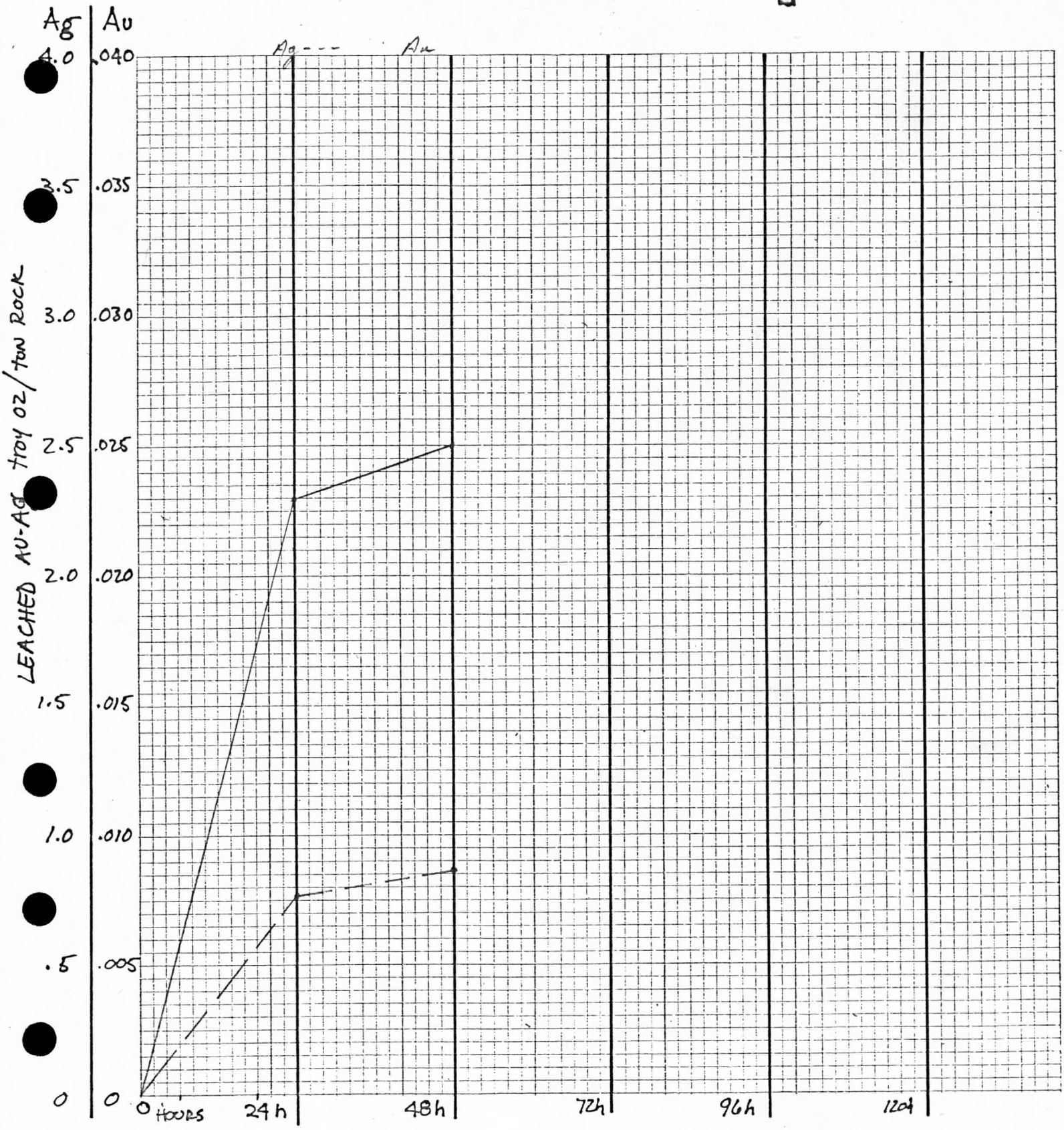
Start 1:00PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.046	1.62						11				
18		.060	2.04				.8		11			1.2	
24	17.75	.066	2.2	.35	.023	.77	.6		11	4gr		1.4	
48	14.5	.089	3.0	.29	.025	.87	1.5		12			0.5	

BARREL TEST

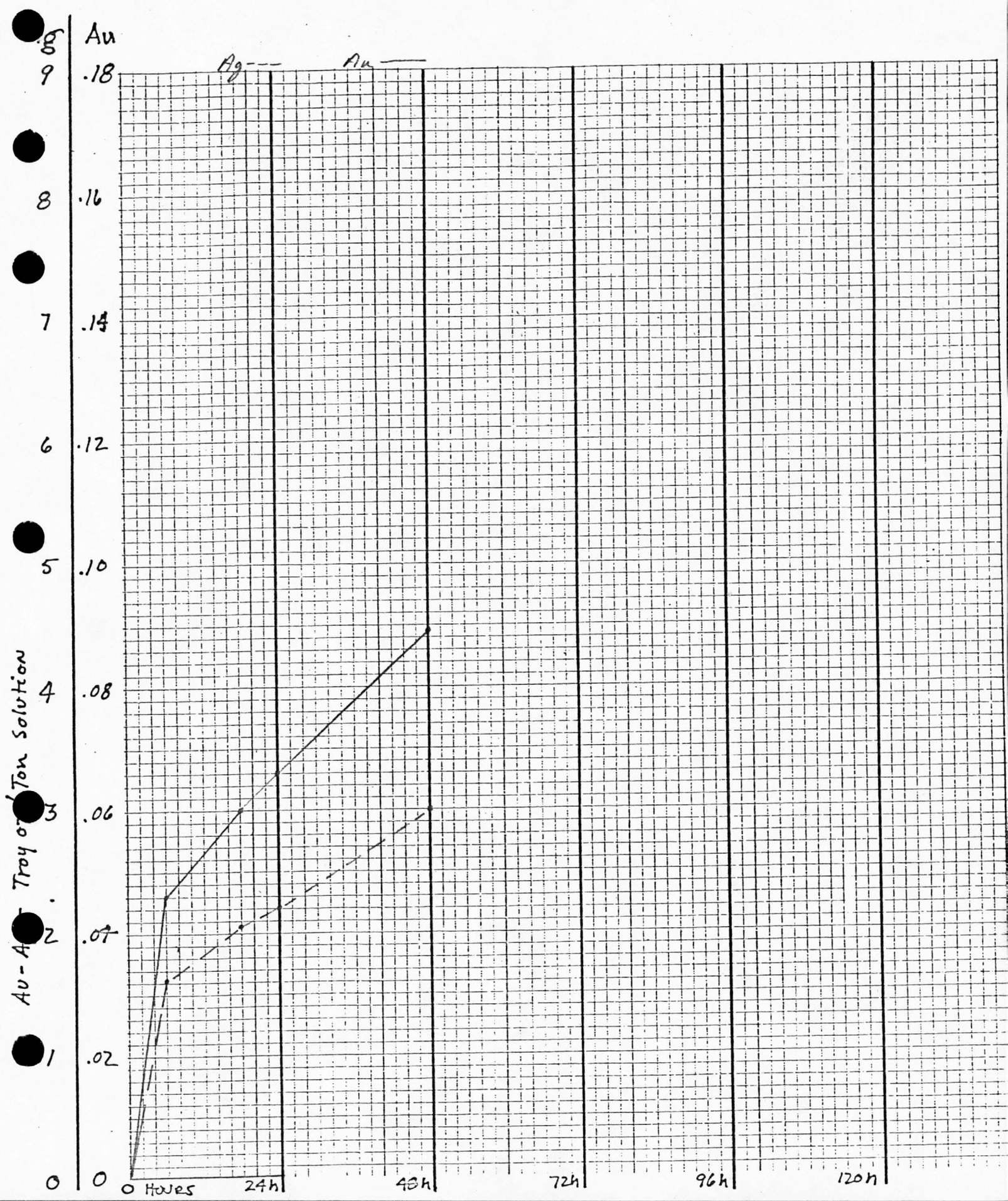
STARTING DATE: 8/20/79

SAMPLE # B-2



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # R-2



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-3 Wet Wt. 65.5 (24hrs) 63.0 (48hrs) $\%H_2O$ Dry Wt. 50

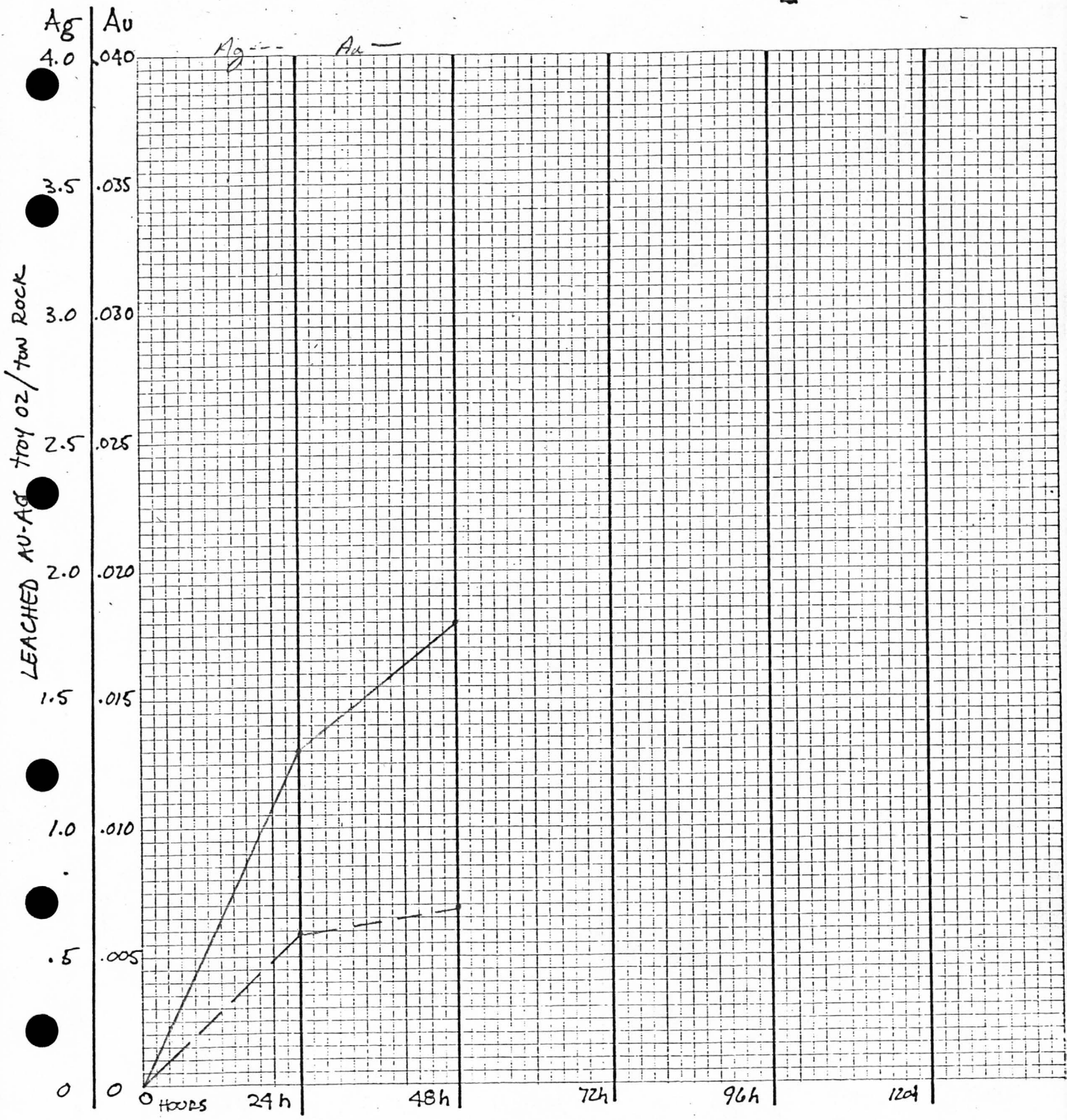
START 1:00 PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.040	1.20				1.7		11			.3	
18		.043	1.72				1.0		11			1.0	
24	15.5	.043	1.92	.31	.013	.59	.8		11	29r		1.2	
48	13.0	.072	2.68	.26	.018	.69	1.4		11			0.6	

BARREL TEST

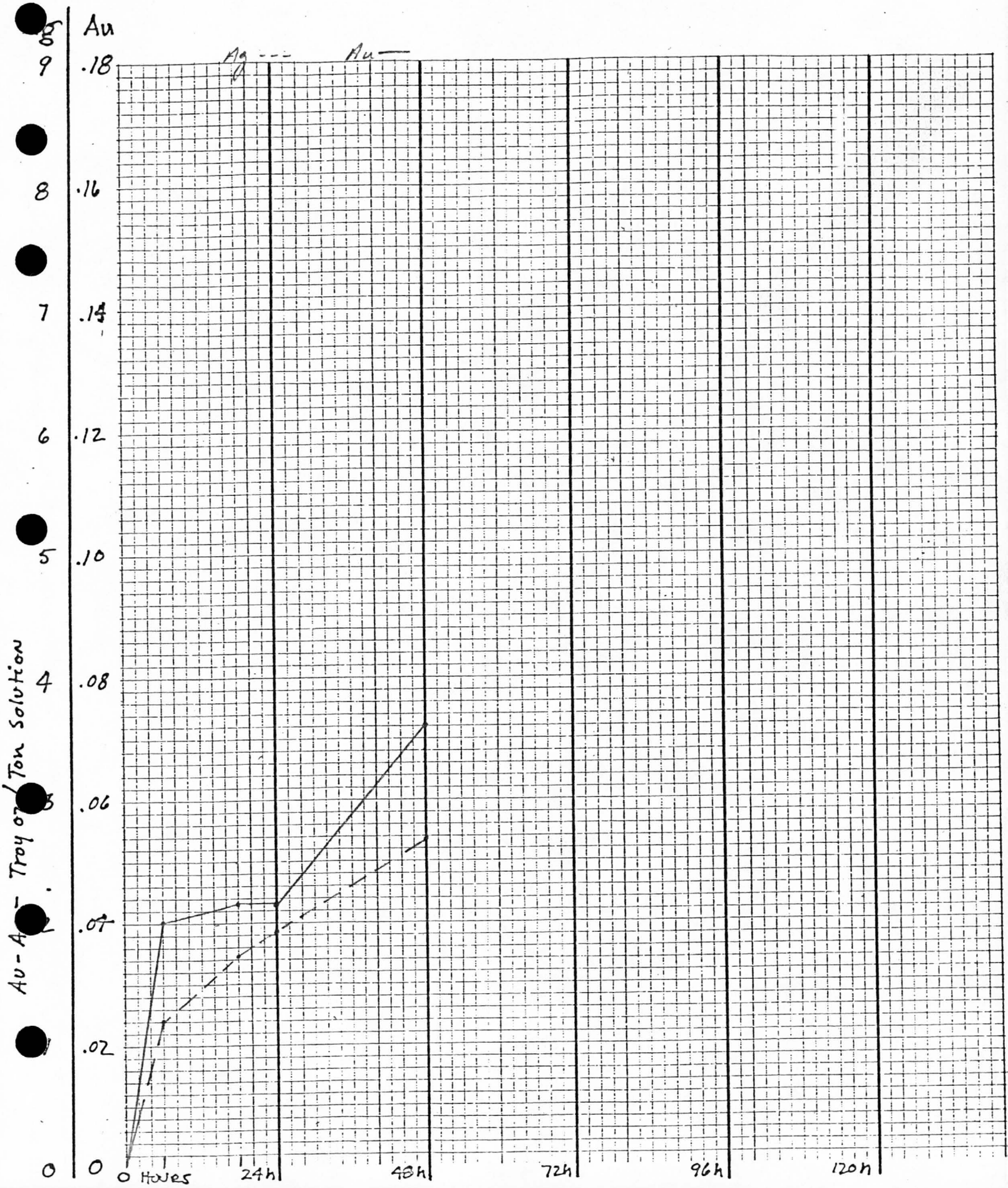
STARTING DATE: 8/20/79

SAMPLE # 8-3



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # B-3



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-4 Wet Wt. 67.5 (24hrs) 64.0 (48hrs) $\%H_2O$ Dry Wt. 50

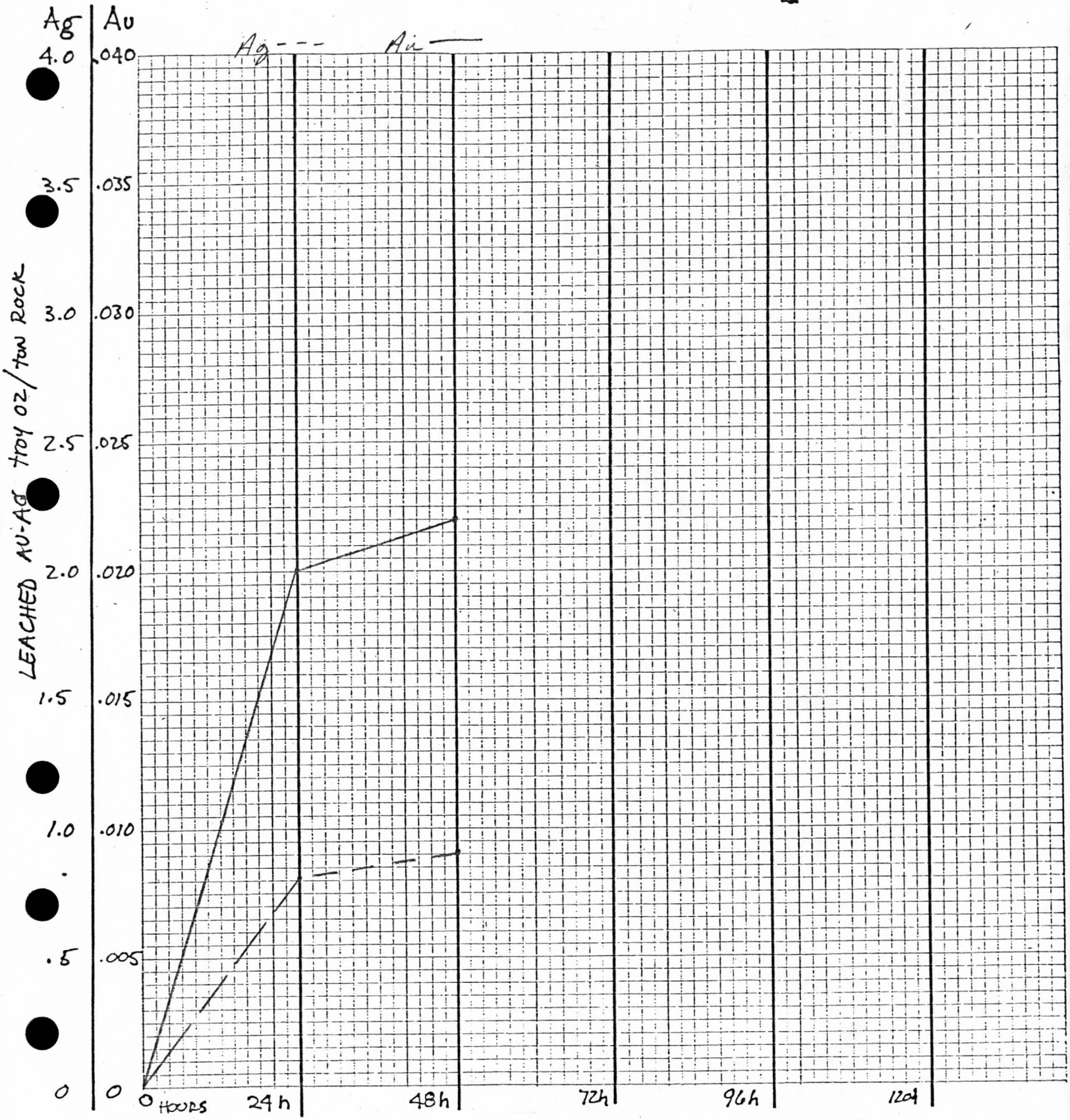
START 1:00PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.040	1.66				1.4		11			.6	
18		.052	2.16				.7		11			1.3	
24	17.5	.058	2.32	.35	.020	.81	.5		11	5gr		1.5	
48	14.0	.081	3.24	.28	.022	.90	1.5		11			0.5	

BARREL TEST

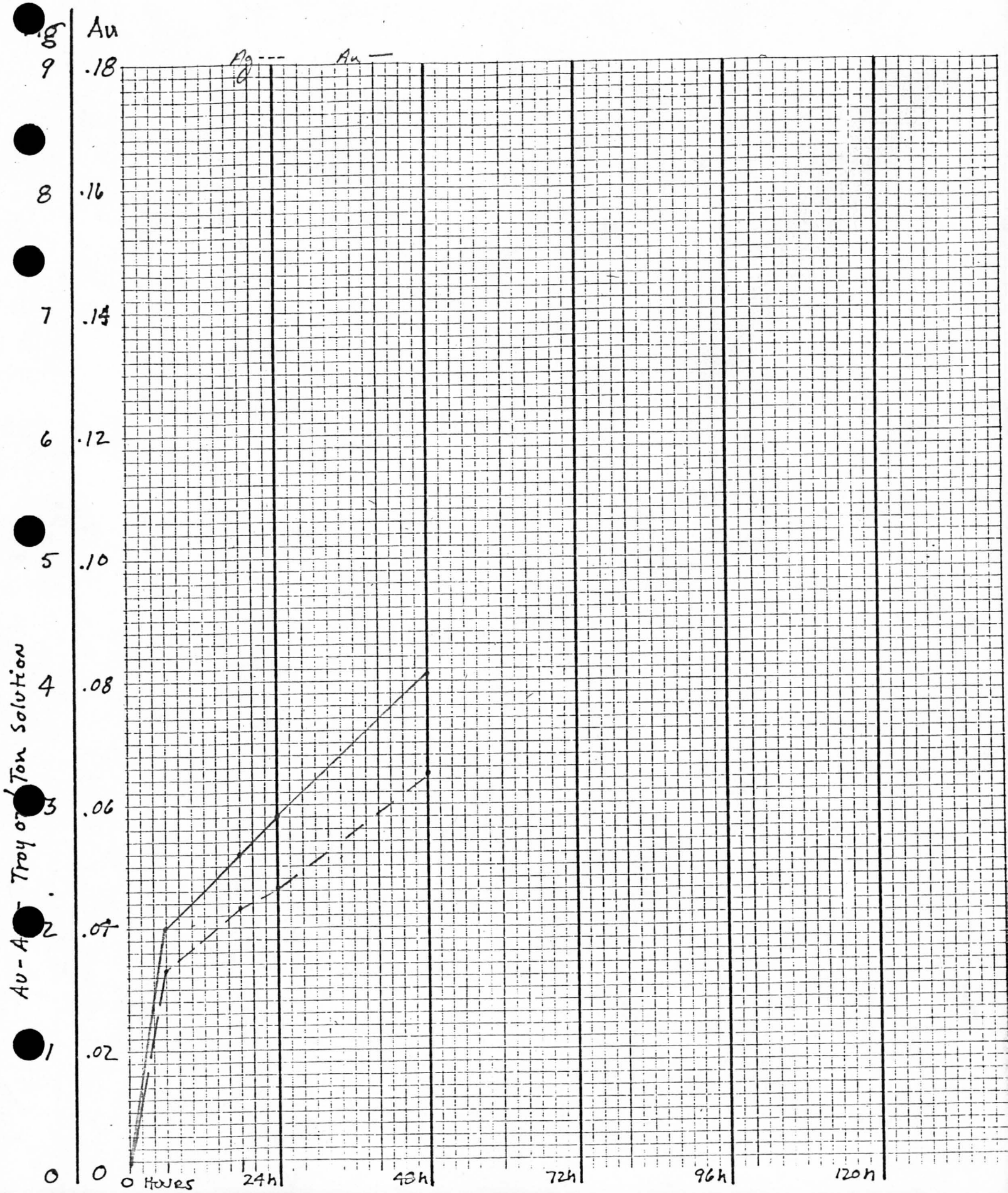
STARTING DATE: 8/20/79

SAMPLE # B-4



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # B-4



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-5 Wet Wt. 67.75 64.0 (24hrs 48hrs) %H_2O Dry Wt. 50

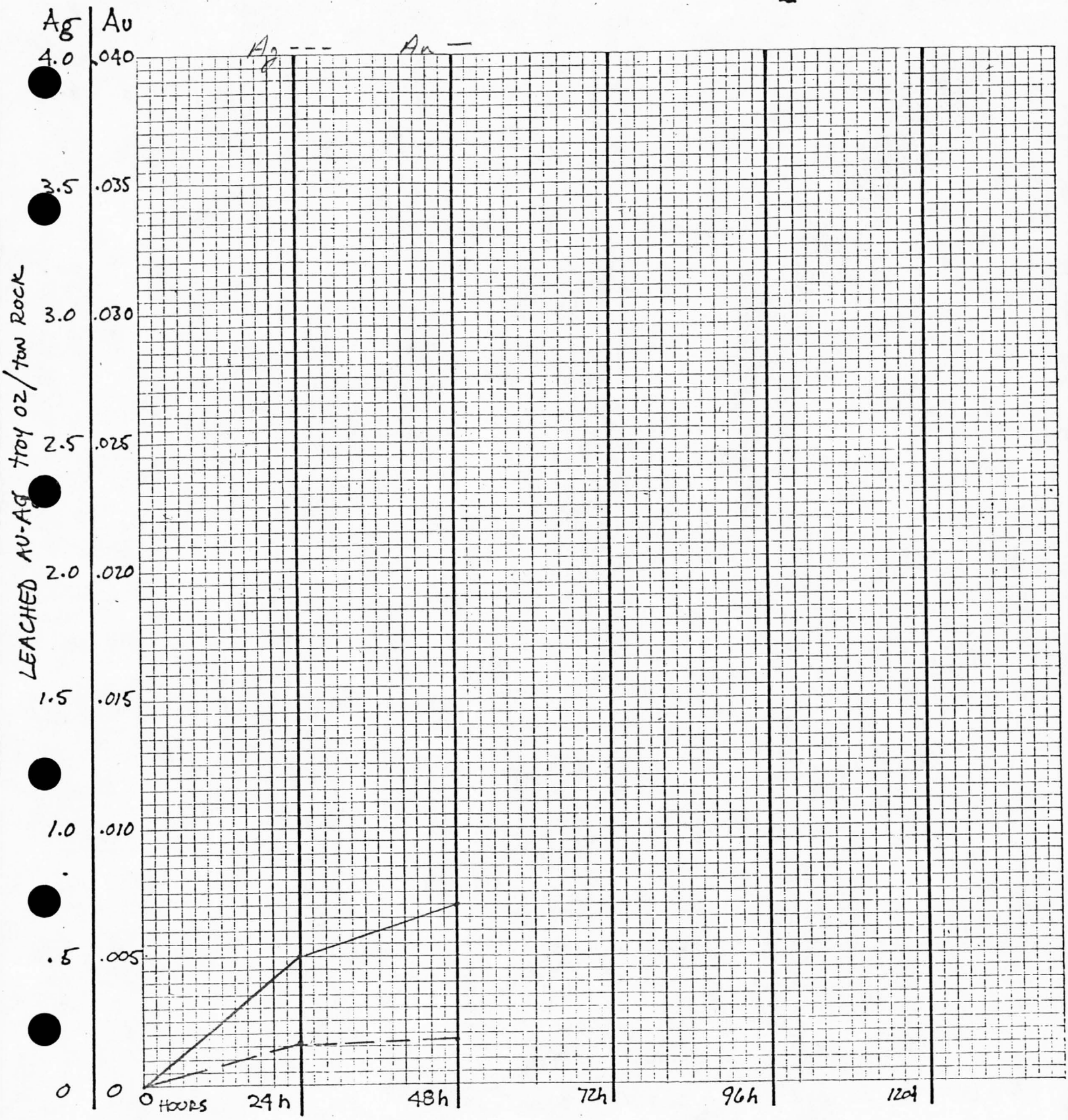
START 1:00PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.014	.39				1.2		11			.8	
18		.020	.44				1.1		11			.9	
24	17.75	.017	.46	.35	.005	.16	.7		11	39r		1.3	
48	14.0	.026	.63	.28	.007	.17	.8		11			1.2	

BARREL TEST

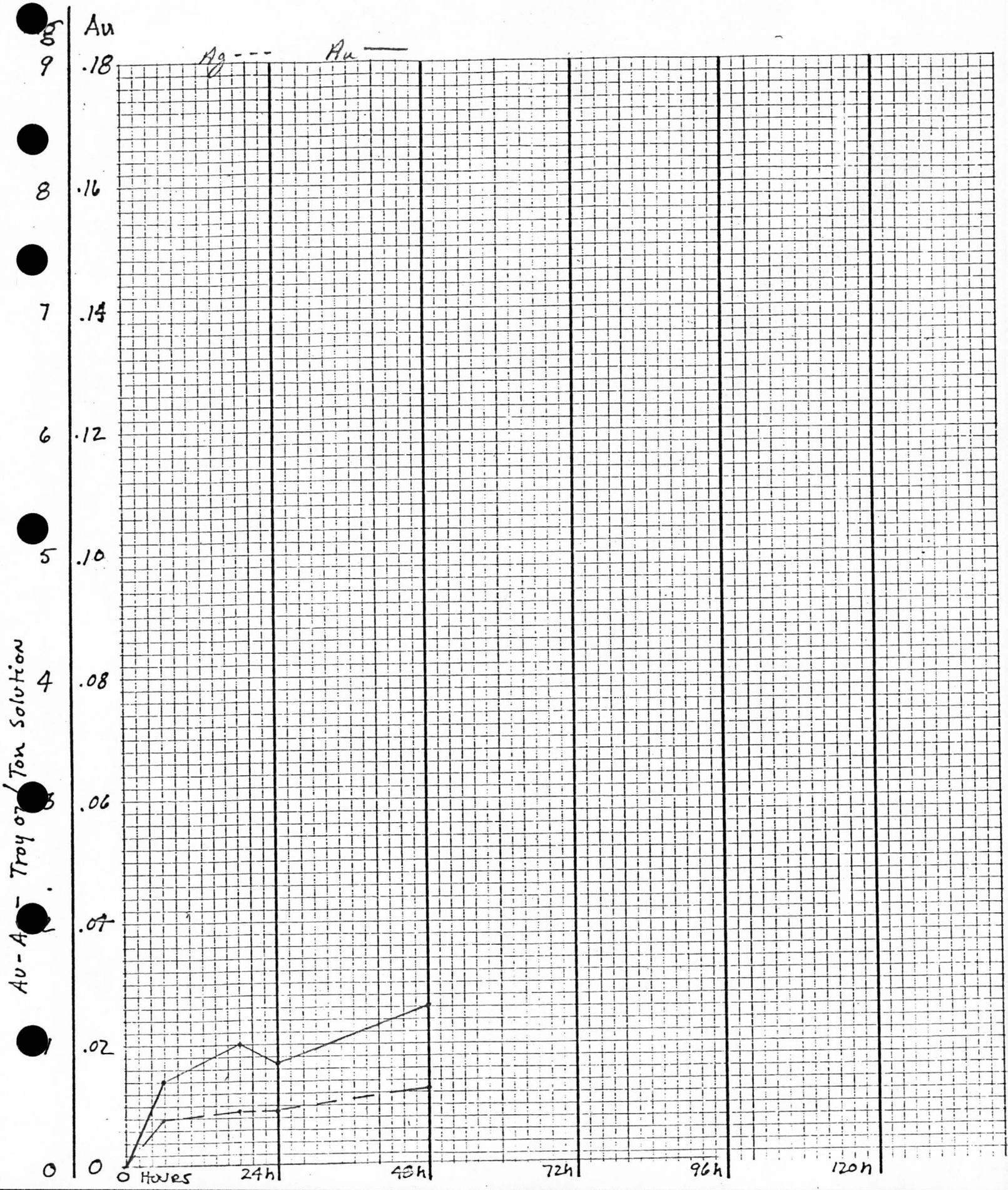
STARTING DATE: 8/20/79

SAMPLE # B-5



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # B-5



BARREL TEST LEACH DATA

175 Ton on South Pad
from South End Continuation Cut

P-418

Tar. Wt. 6
Total

Sample Identification B-6 Wet Wt. 64.5 (24hr) 61.5 (48hr) %H_2O Dry Wt. 50

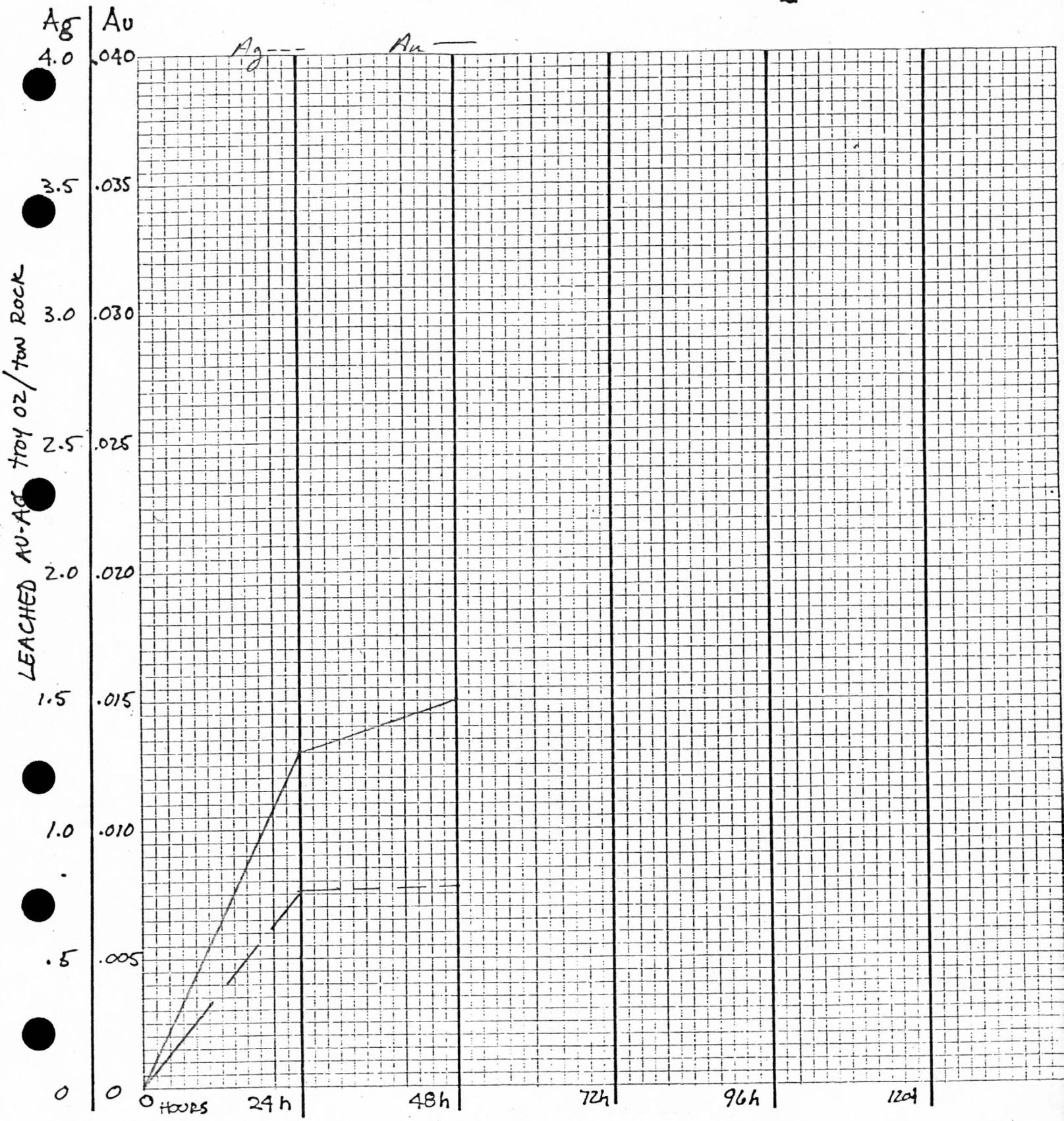
START 1:00 PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.040	2.20				1.6		11			.4	
18		.043	2.56				.8		10			1.2	
24	14.5	.046	2.68	.29	.013	.77	.7		10	39r		1.3	
48	11.5	.066	3.40	.23	.015	.78	1.4		10			0.6	

BARREL TEST

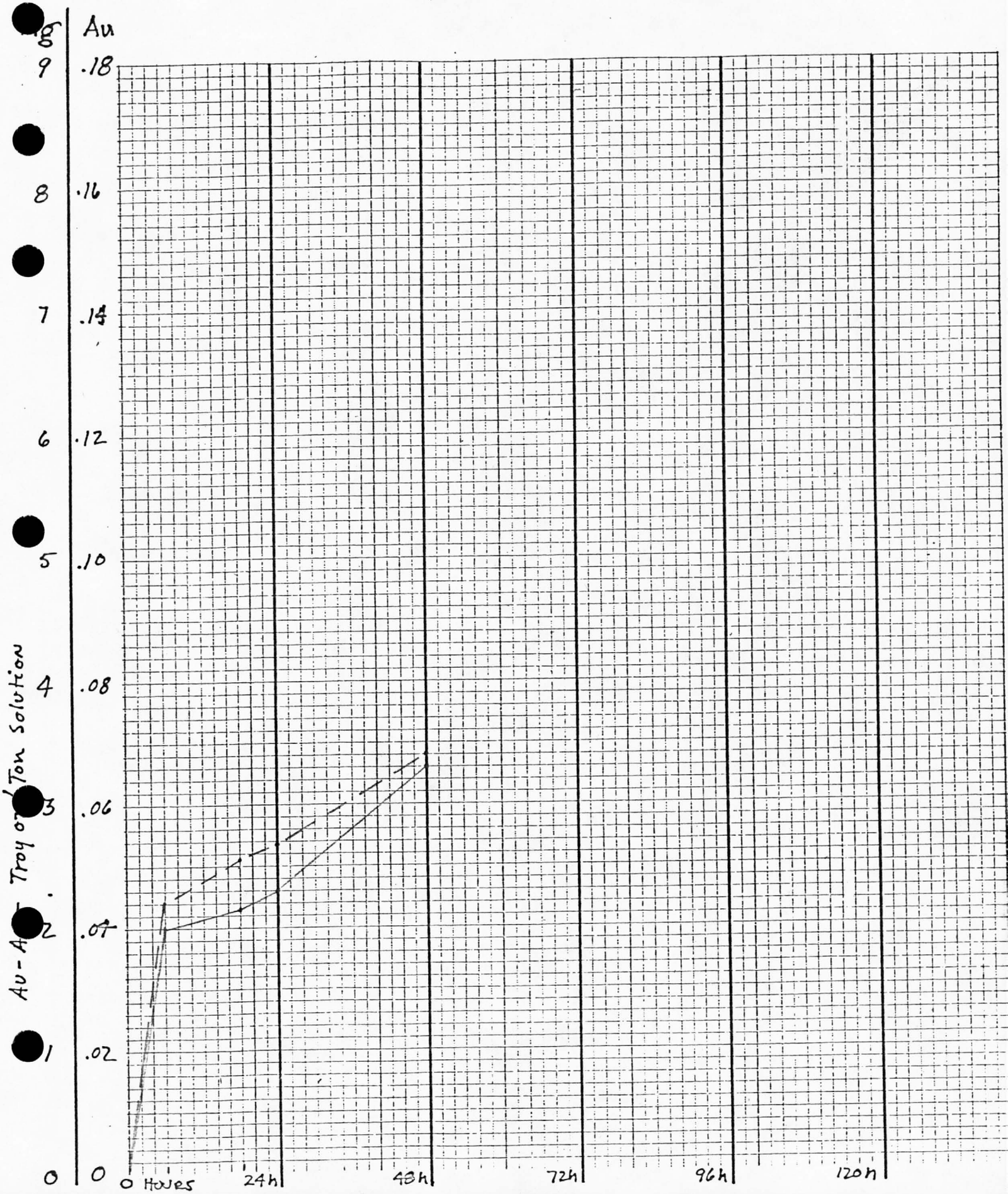
STARTING DATE: 8/20/79

SAMPLE # B-6



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # B-6



BARREL TEST LEACH DATA

175 Ton on South Pad
South End Contention Cut

P-418

Tar. Wt. 6
Total

Sample Identification B-7

Wet Wt. 66.0 (24hrs) 63.5 (48hrs) $\%H_2O$ Dry Wt. 50

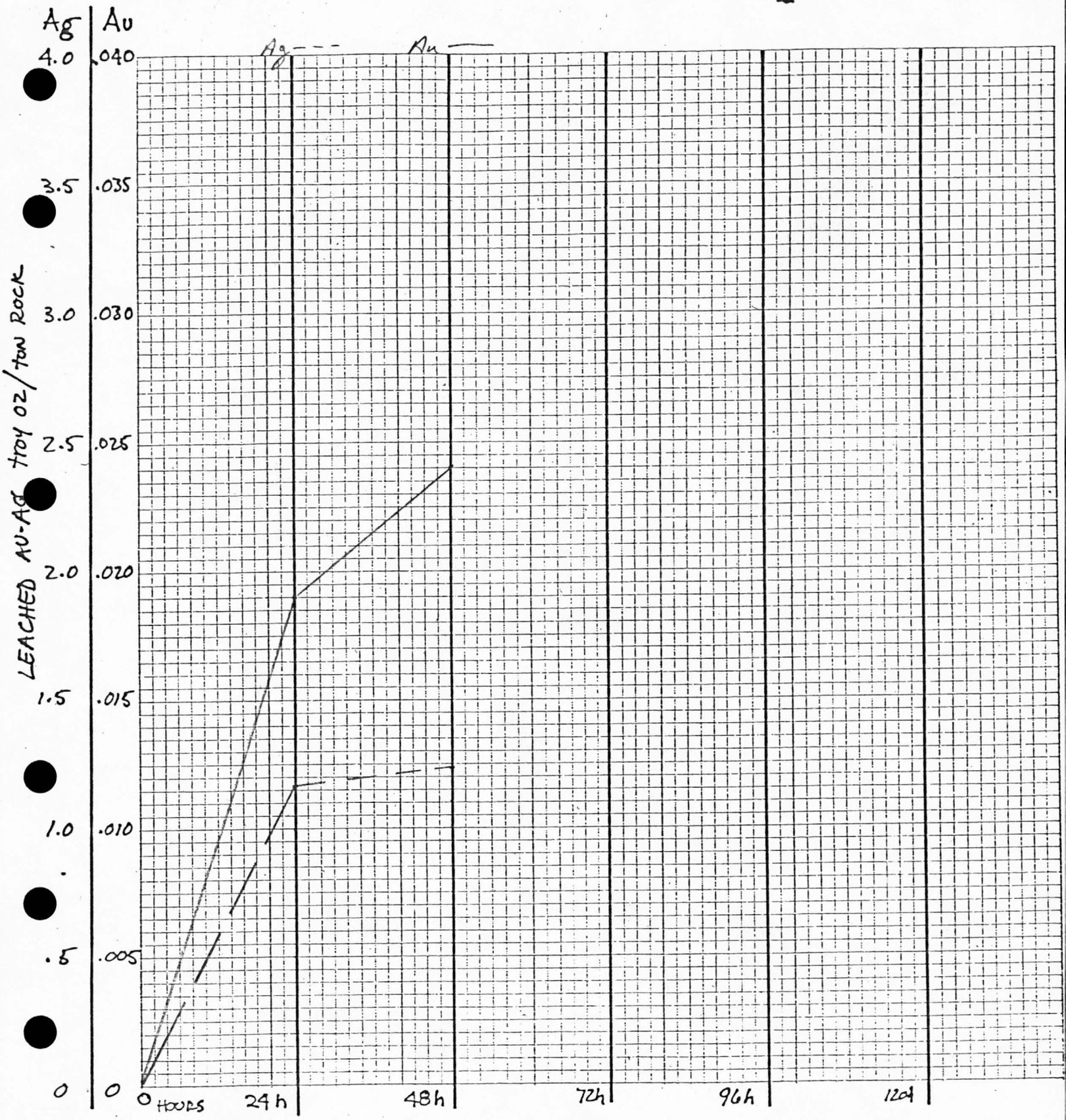
START 1:00 PM Aug 20, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6		.043	2.80				1.1		11			.9	
18		.060	3.40				.8		10			1.2	
24	16.0	.060	3.68	.32	.019	1.17	.4		10	5gr	2gr	1.6	
48	13.5	.059	4.68	.27	.024	1.23	.7		12			1.3	

BARREL TEST

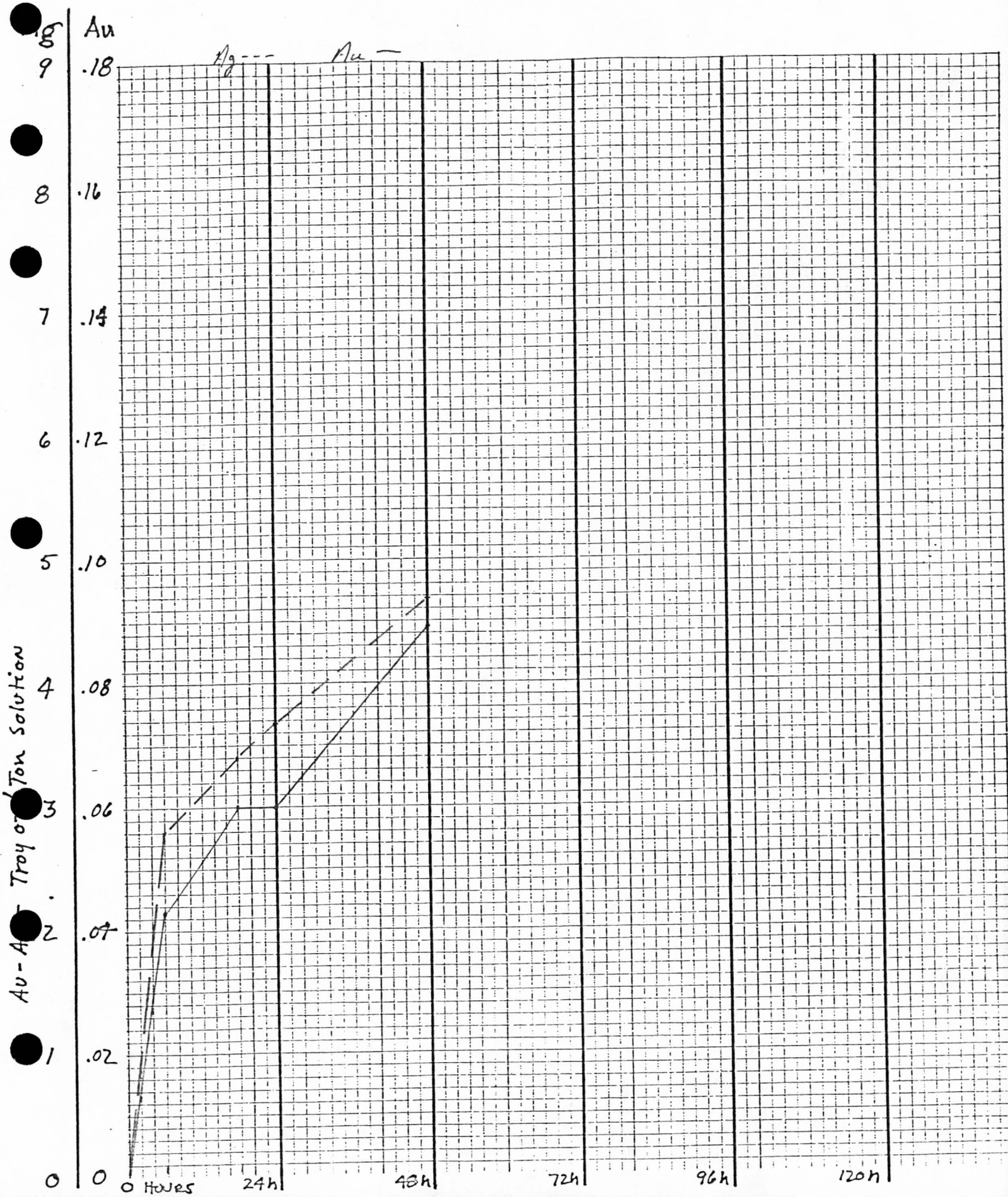
STARTING DATE: 8/20/71

SAMPLE # B-7



STARTING DATE: 8/20/79

BARREL TEST SAMPLE # B-7



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-8 Wet Wt. 70.5 67.0 %H_2O Dry Wt. 50 lbs
24 hrs 36 hrs
64.5 61.0

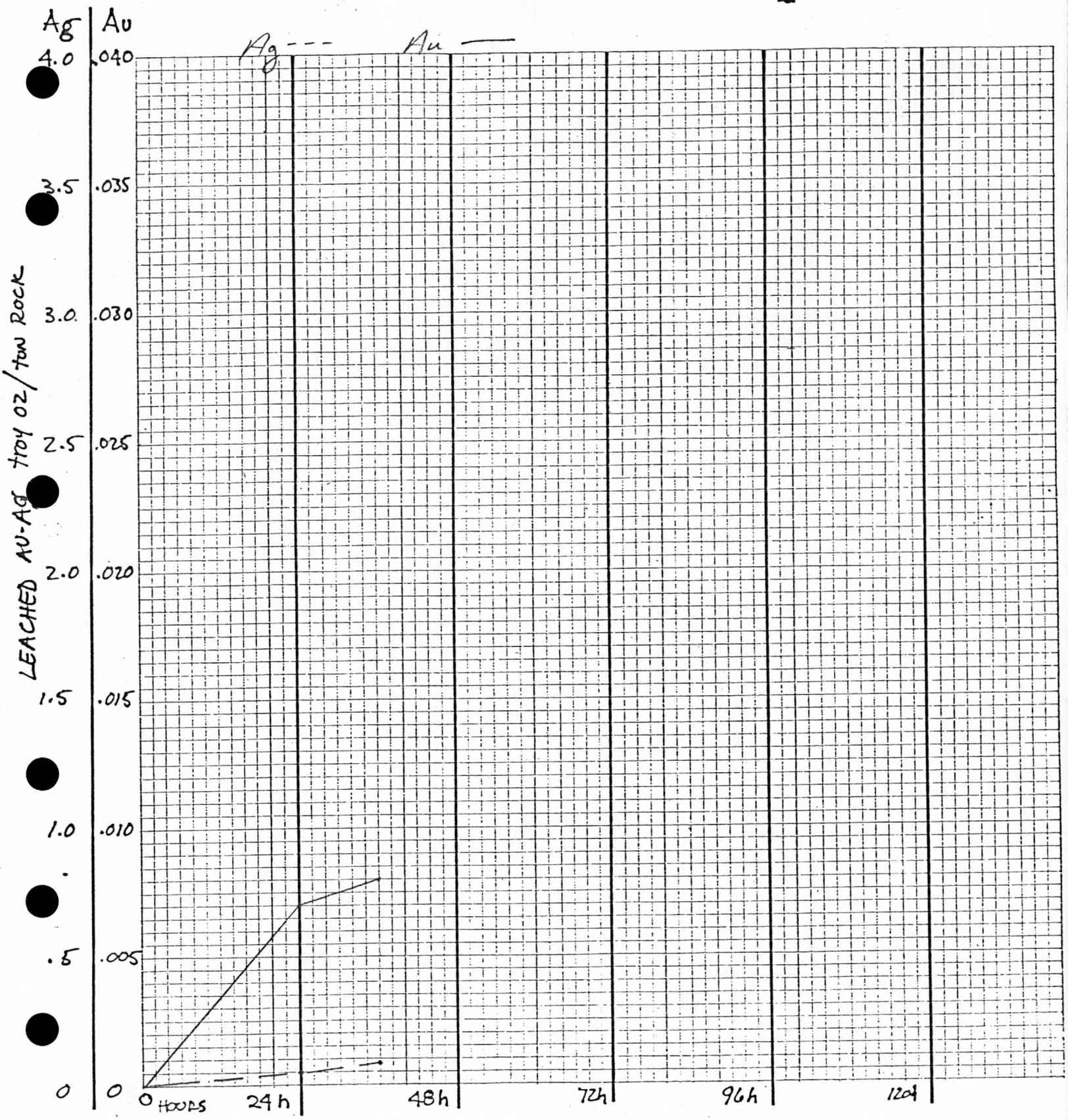
DATE: AUG 22, 1979 8:30 AM

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.001	.14				2.0		12			0	
24	14.5	.026	.18	.29	.007	.05	1.8		12			0.2	
36	11.0	.037	.26	.22	.008	.08	1.0		12			1.0	

BARREL TEST

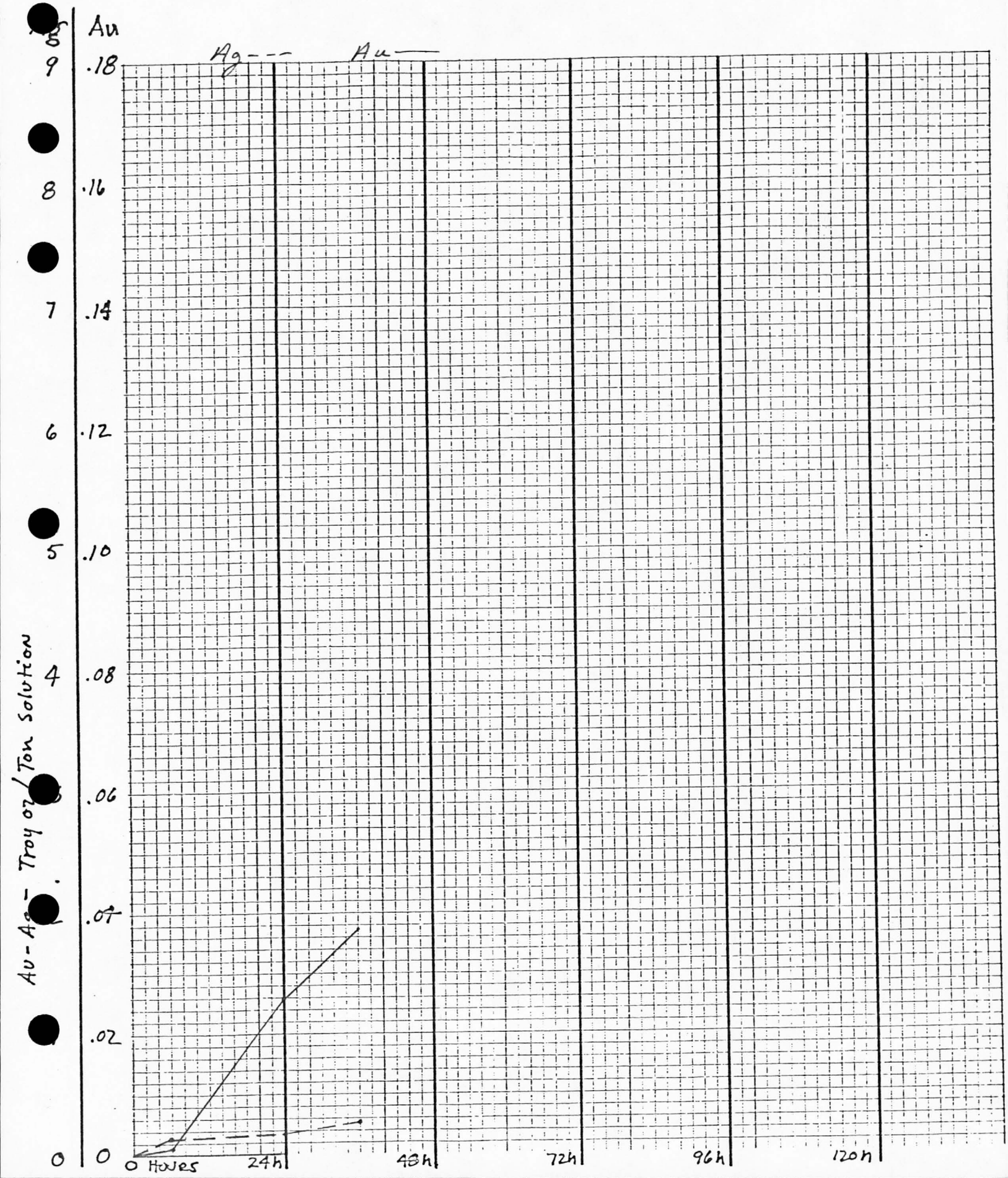
STARTING DATE: 8/22/79

SAMPLE # R-8



STARTING DATE: 8/22/71

BARREL TEST SAMPLE # B-8



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-9 Wet Wt. 71.5 67.5 %H_2O Dry Wt. 50 lbs
24hr 36hr
65.5 61.5

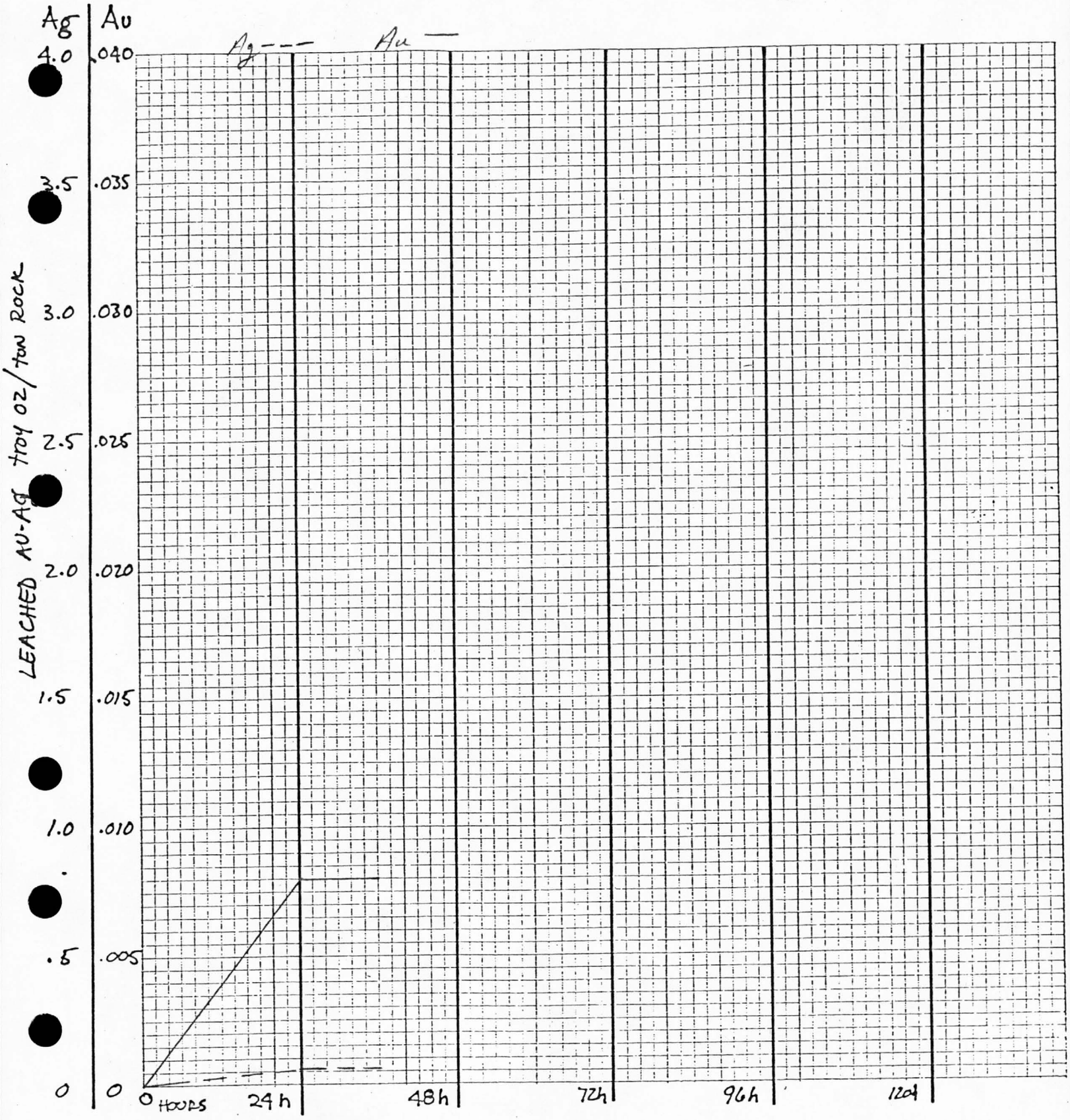
Aug. 22, 1979 8:30 AM

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.001	.15				1.8		12			0.2	
24	15.5	.026	.18	.31	.008	.06	1.7		12			0.3	
36	11.5	.034	.25	.23	.008	.06	1.6		12			0.4	

BARREL TEST

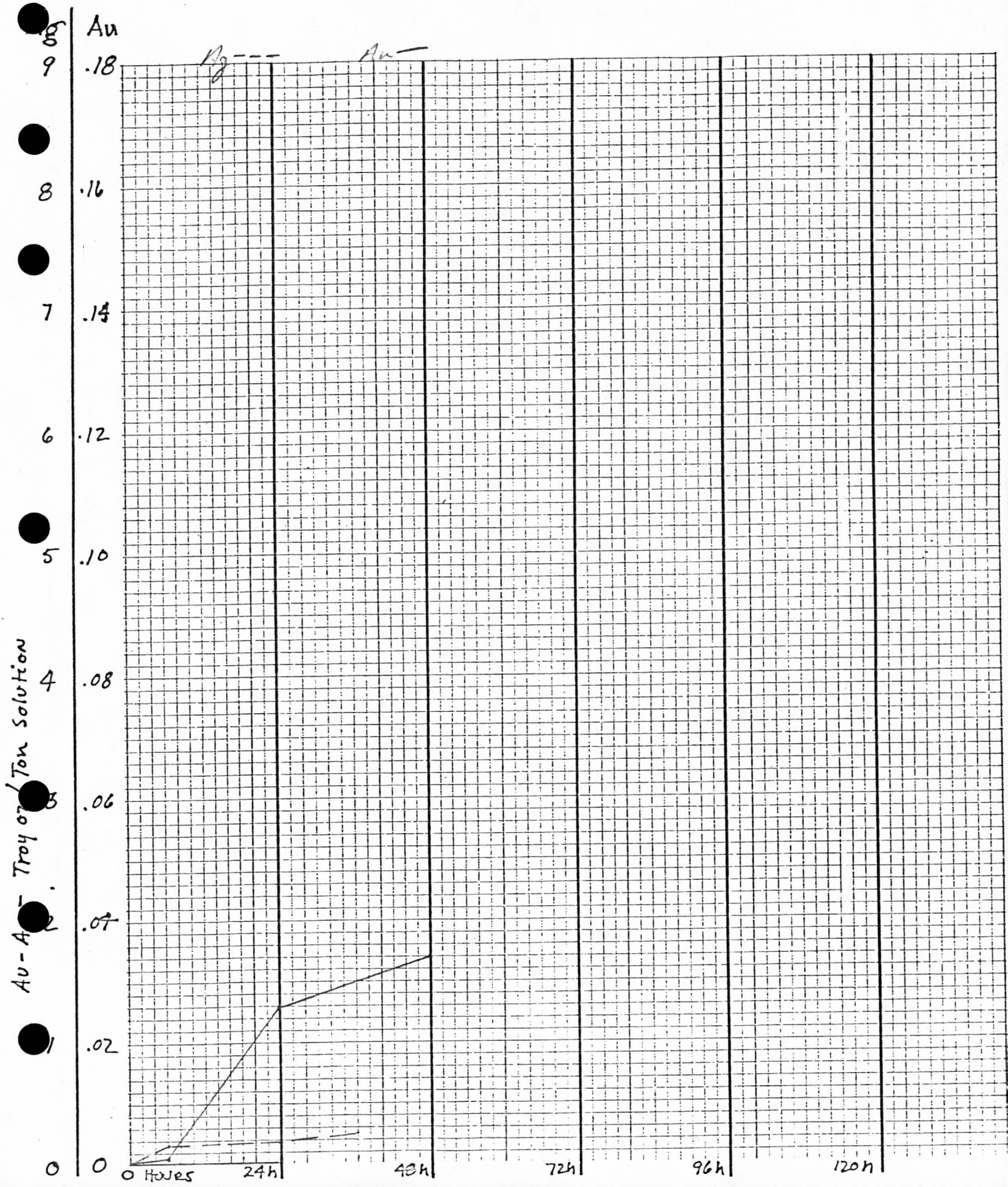
STARTING DATE: 8/22/79

SAMPLE # B-9



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # B-9



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

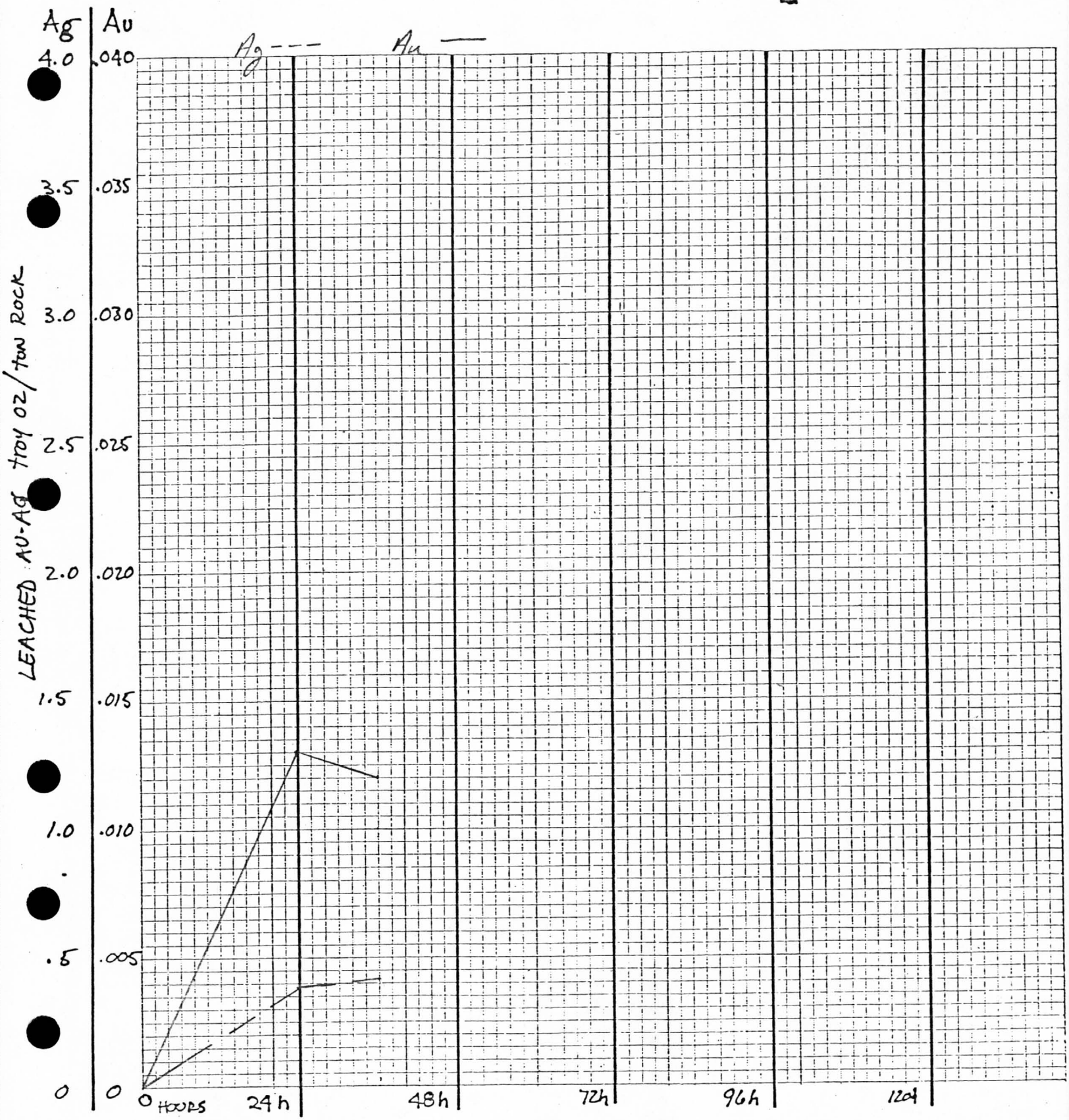
Sample Identification B-10 Wet Wt. 71.5 68.0 %H_2O Dry Wt. 50 lbs
24hr 36hrs
Aug 22, 1979 8:30 AM 65.5 62.0

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.029	.97				1.2		12			0.8	
24	15.5	.043	1.22	.31	.013	.38	1.1		12			0.9	
36	12.0	.049	1.74	.24	.012	.42	0.6		11			1.4	

BARREL TEST

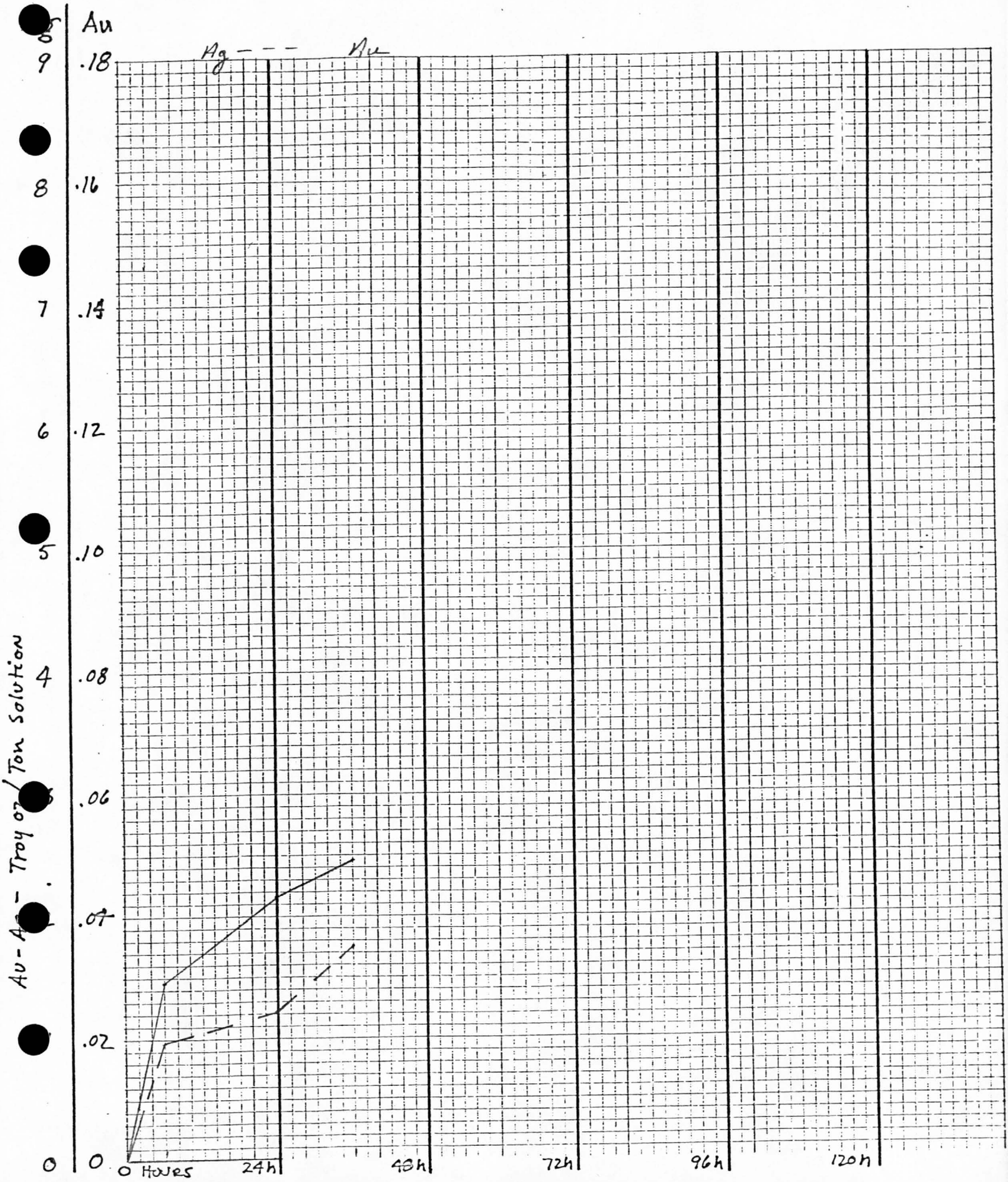
STARTING DATE: 8/22/79

SAMPLE # B-10



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # 15-10



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-11 Wet Wt. 71.5 67.5 $\%H_2O$ Dry Wt. 50 lbs
24 hr 36 hrs
65.5 61.5

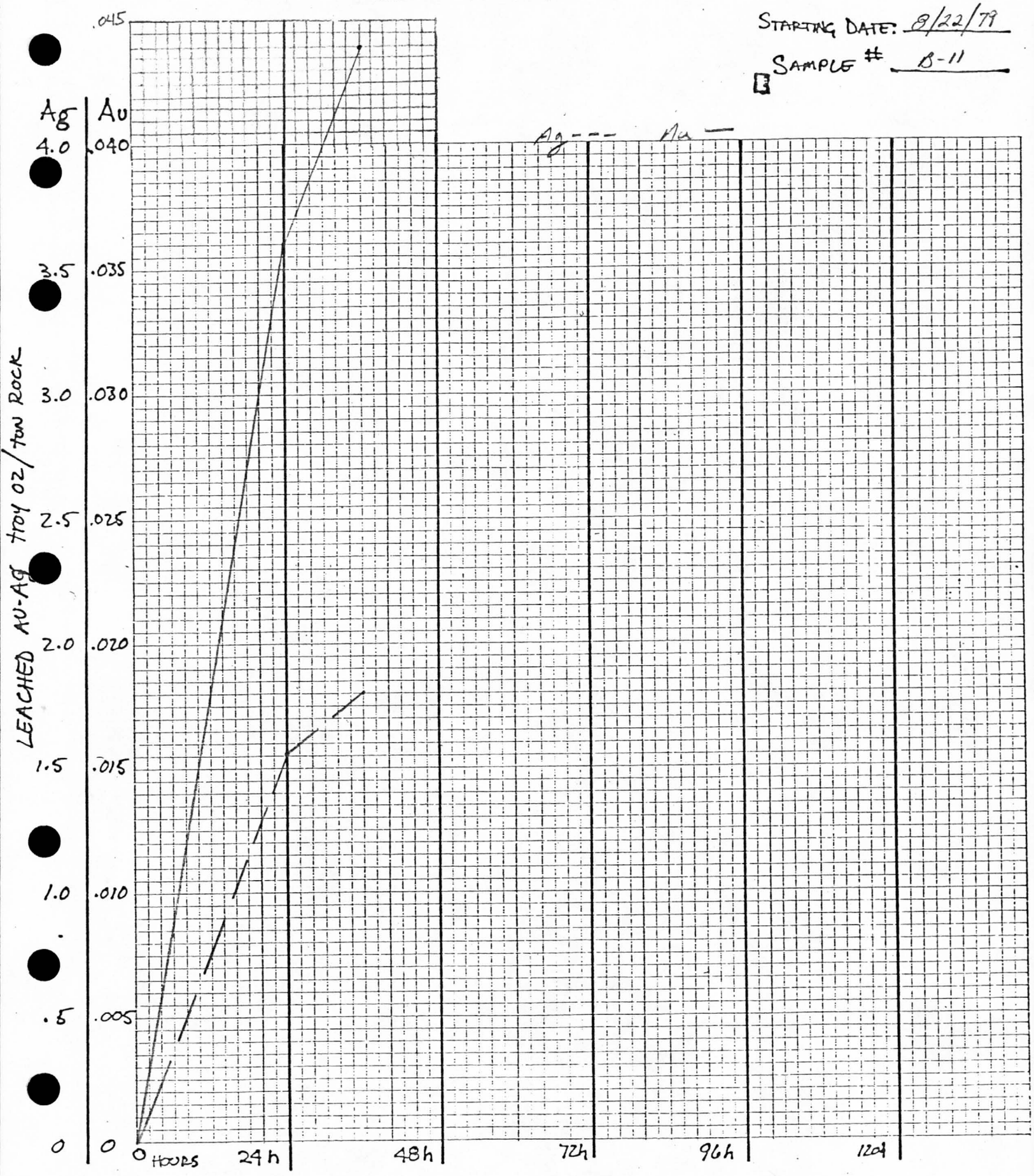
Aug. 22, 1979 8:30 AM.

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.069	3.76				1.1		12			0.9	
24	15.5	.118	5.04	.31	.036	1.56	0.6		9	7qr	2qr	1.4	
36	11.5	.194	7.84	.23	.044	1.80	1.2		11			0.8	

BARREL TEST

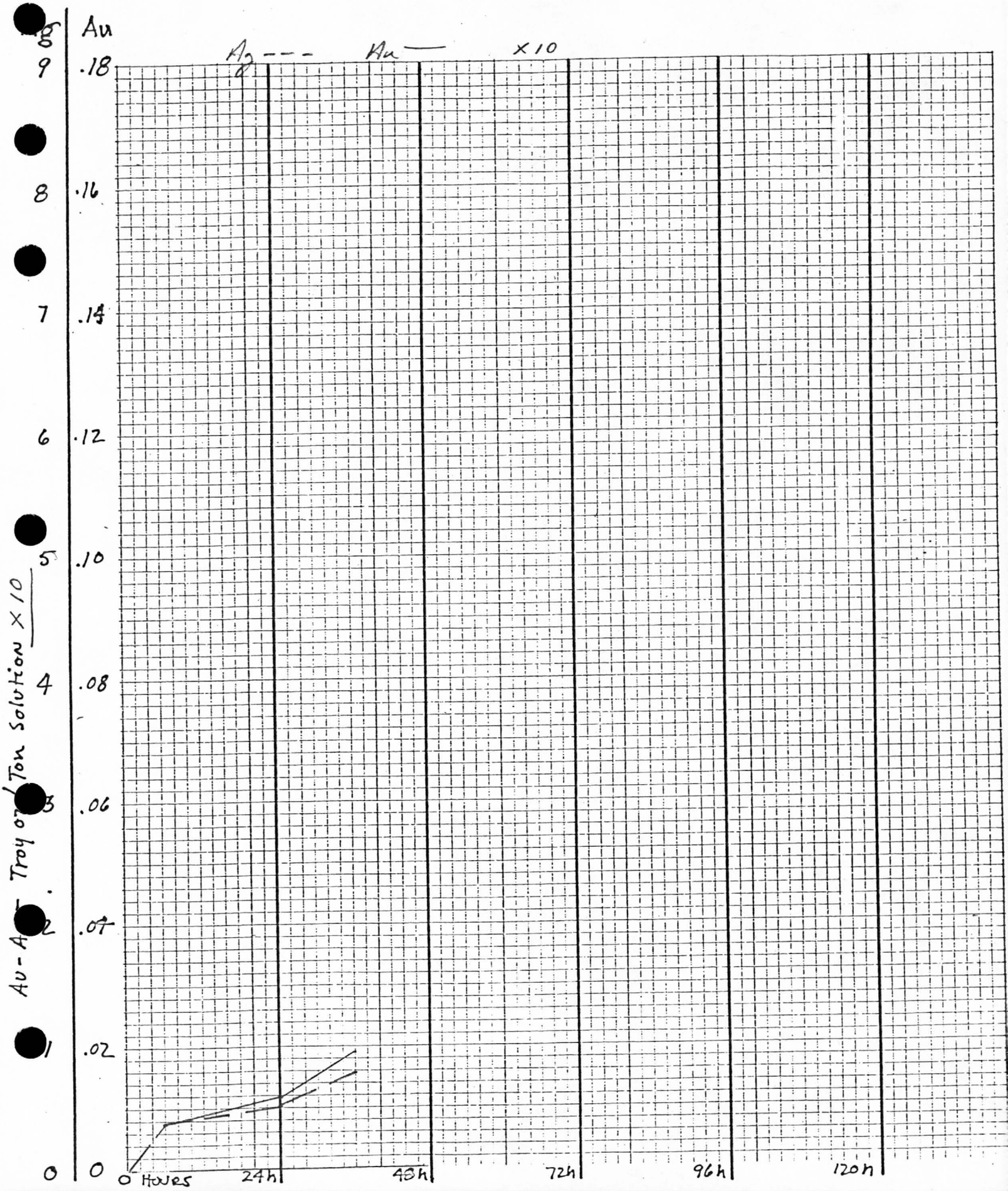
STARTING DATE: 8/22/79

SAMPLE # B-11



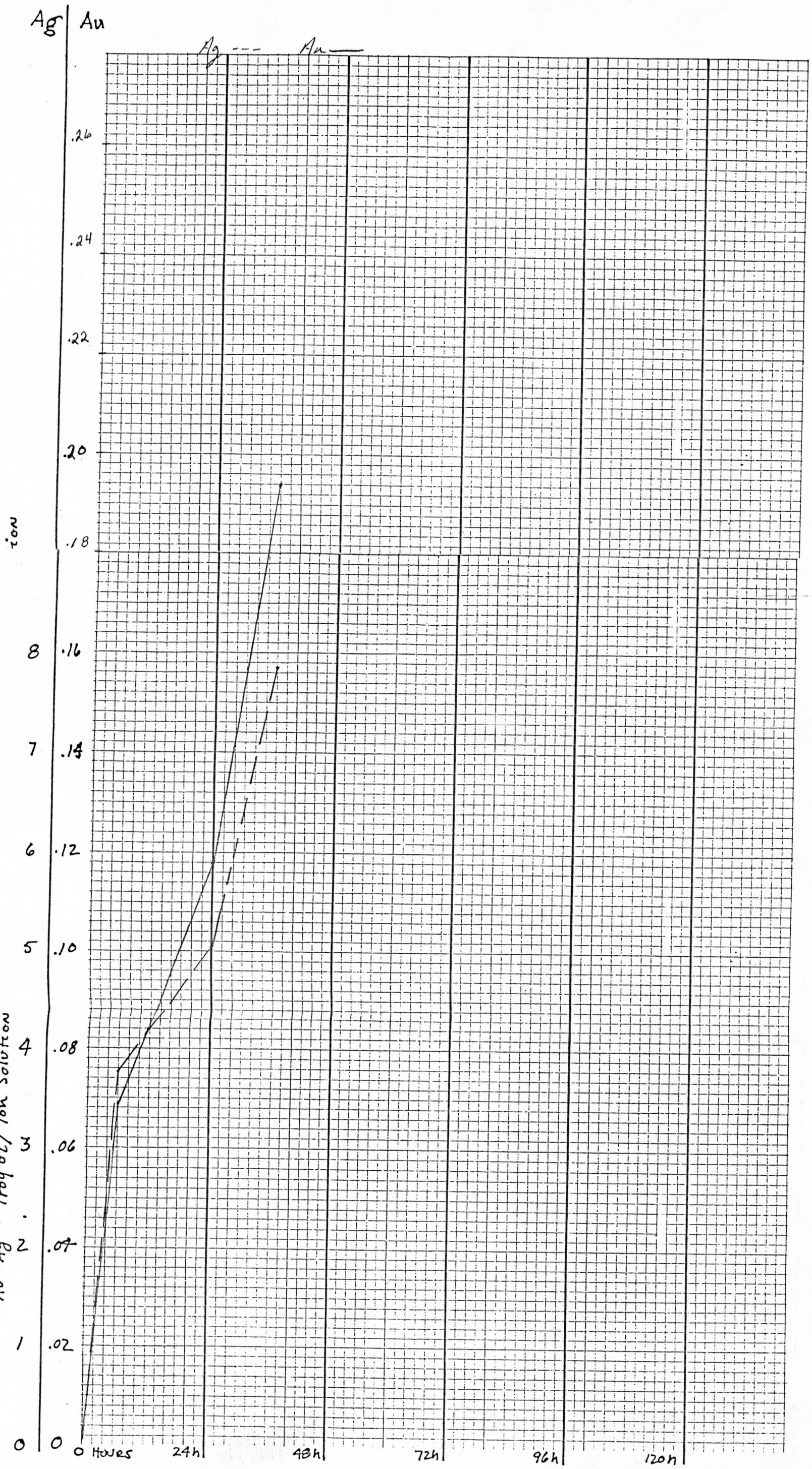
STARTING DATE: 8/22/79

BARREL TEST SAMPLE # B-11



STARTING DATE: 9/22/79

BARREL TEST SAMPLE # B-11



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-12 Wet Wt. 64.5 (24hr) 61.0 (36hr) %H_2O Dry Wt. 50 lbs

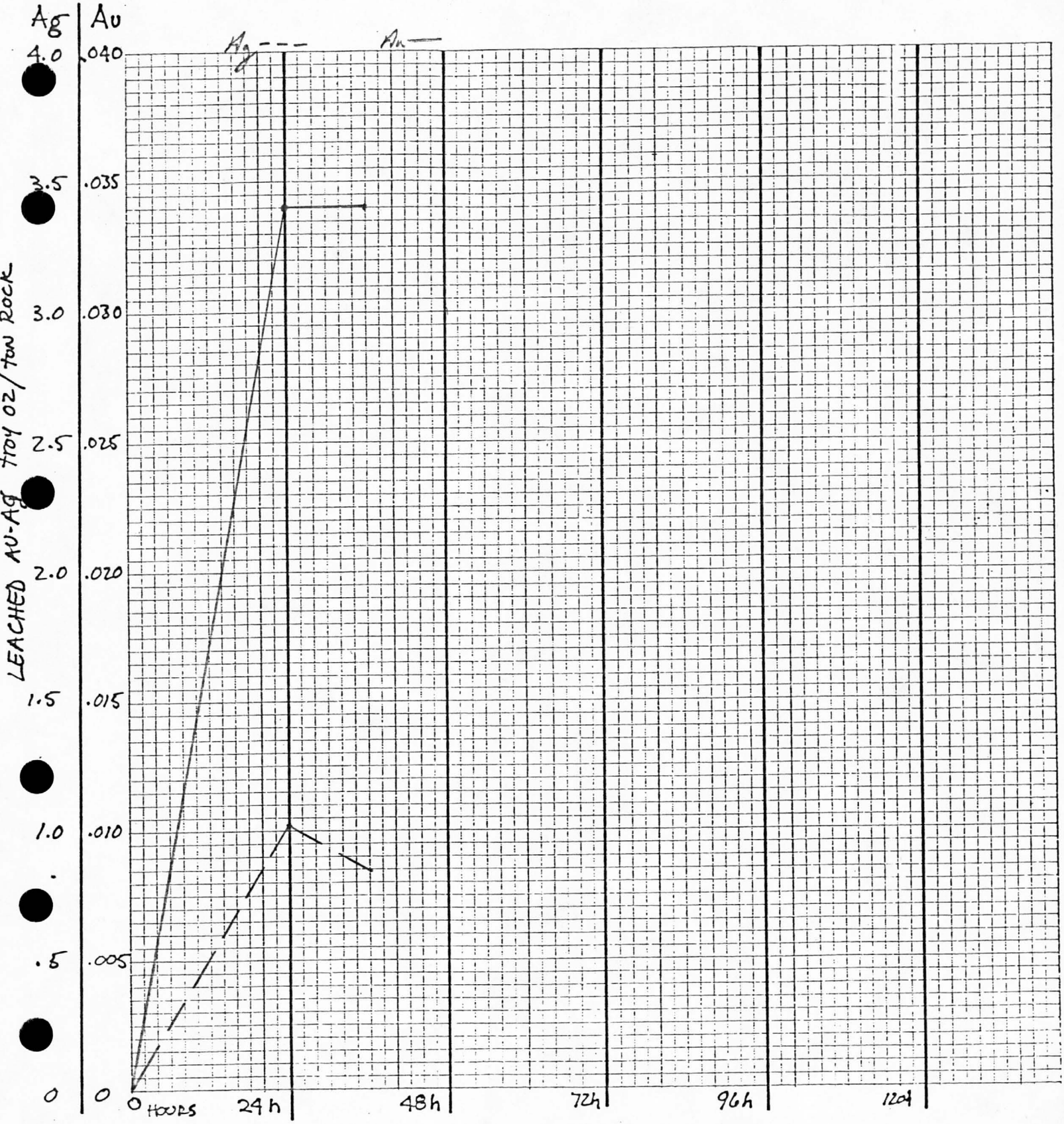
Aug. 22, 1979 8:30 AM

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED.	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.015	3.0				1.0		11			1.0	
24	14.5	.118	3.52	.29	.034	1.02	0.7		9	7gr	2gr	1.3	
36	11.0	.154	3.84	.22	.034	0.84	1.1		12			0.9	

BARREL TEST

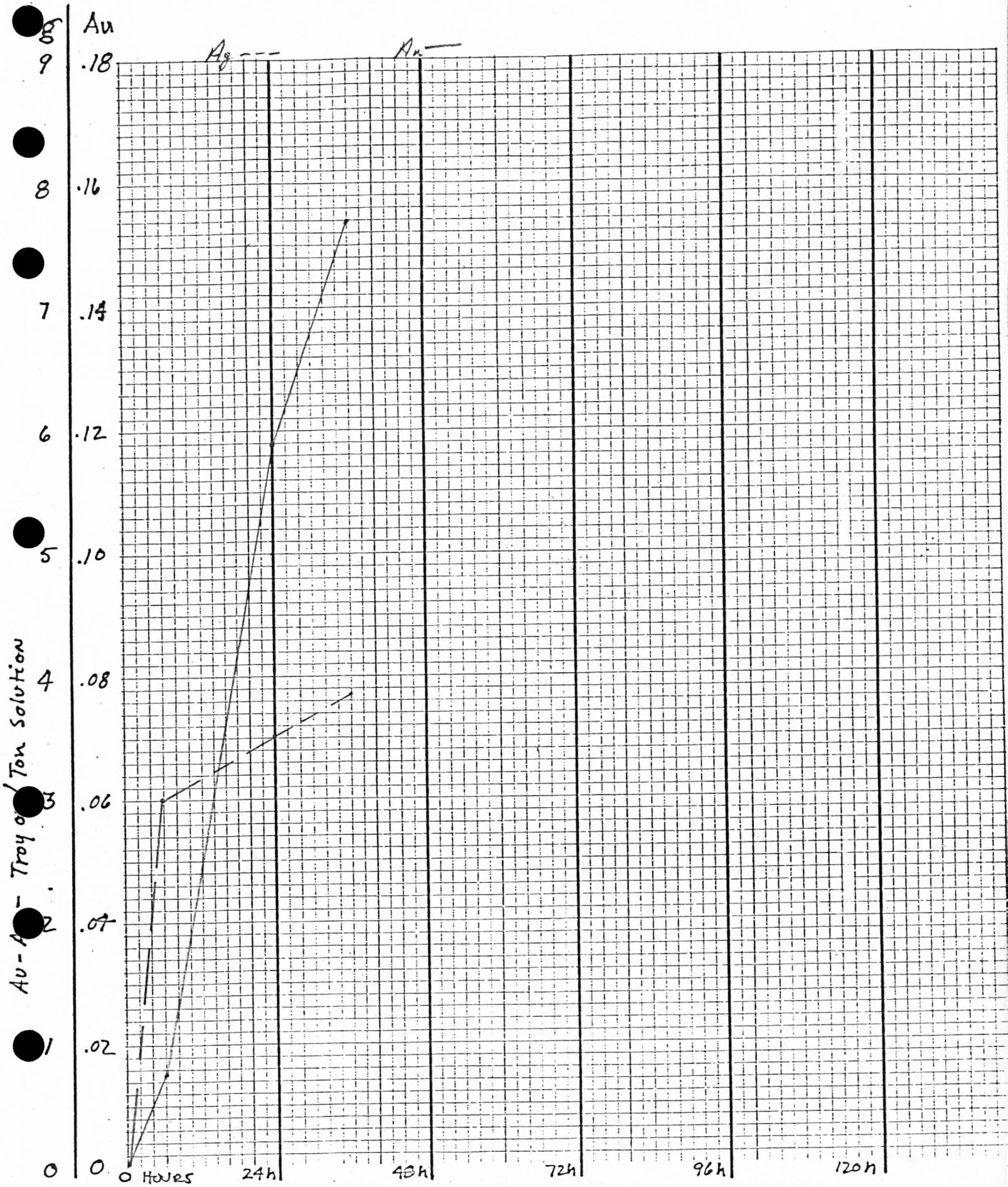
STARTING DATE: 8/22/79

SAMPLE # B-12



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # B-12



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-13

Wet Wt. 64.0 (24 hr) 60.0 (36 hr) %H_2O Dry Wt. 50 lbs

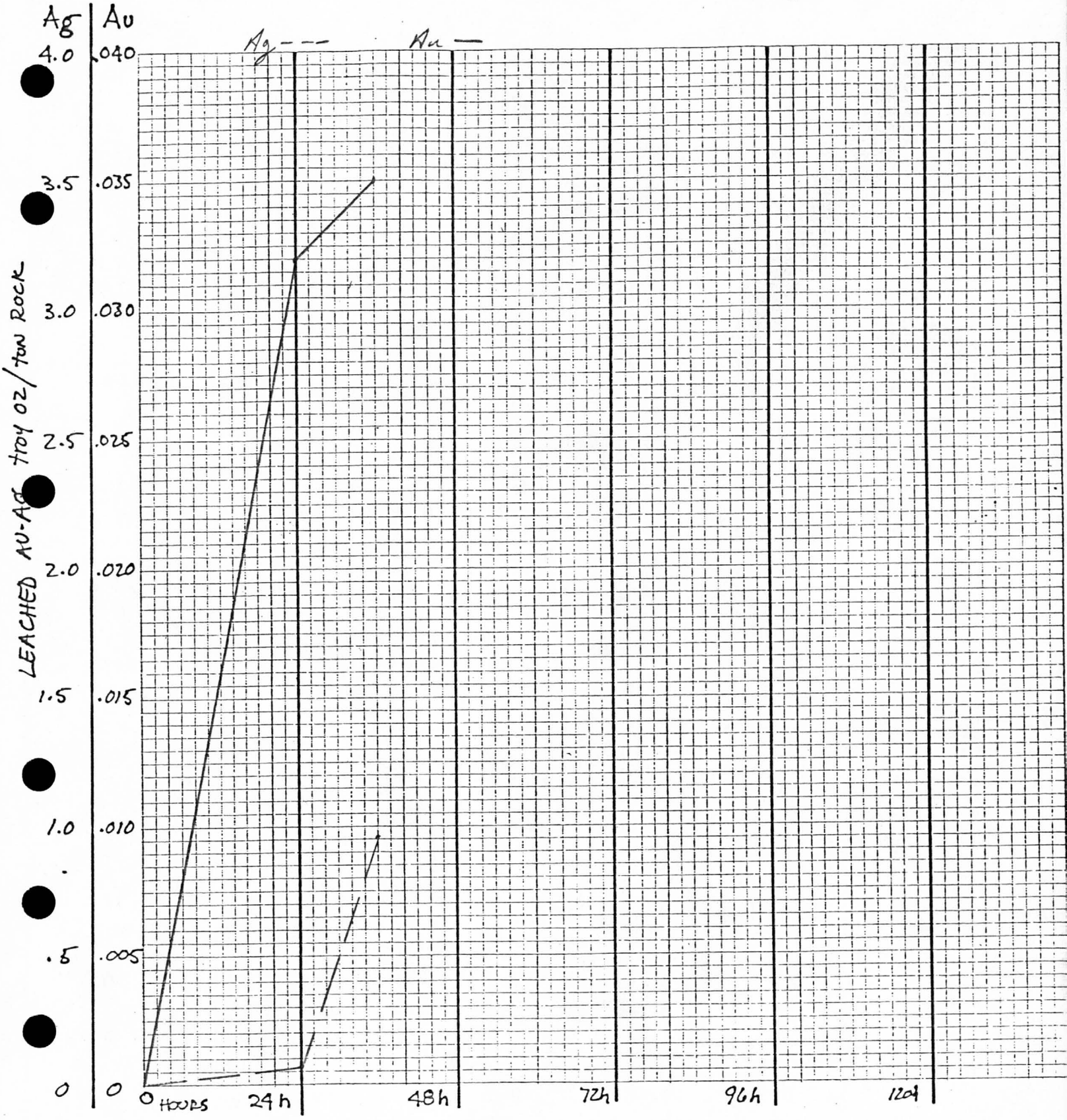
Aug. 22, 1979 8:30 A.M.

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS.		.062	3.12				1.2		12			0.8	
24	14.0	.116	0.25	.28	.032	.07	0.6		10	7gr	1gr	1.4	
36	10.0	.174	4.80	.20	.035	.96	1.1		12			0.9	

BARREL TEST

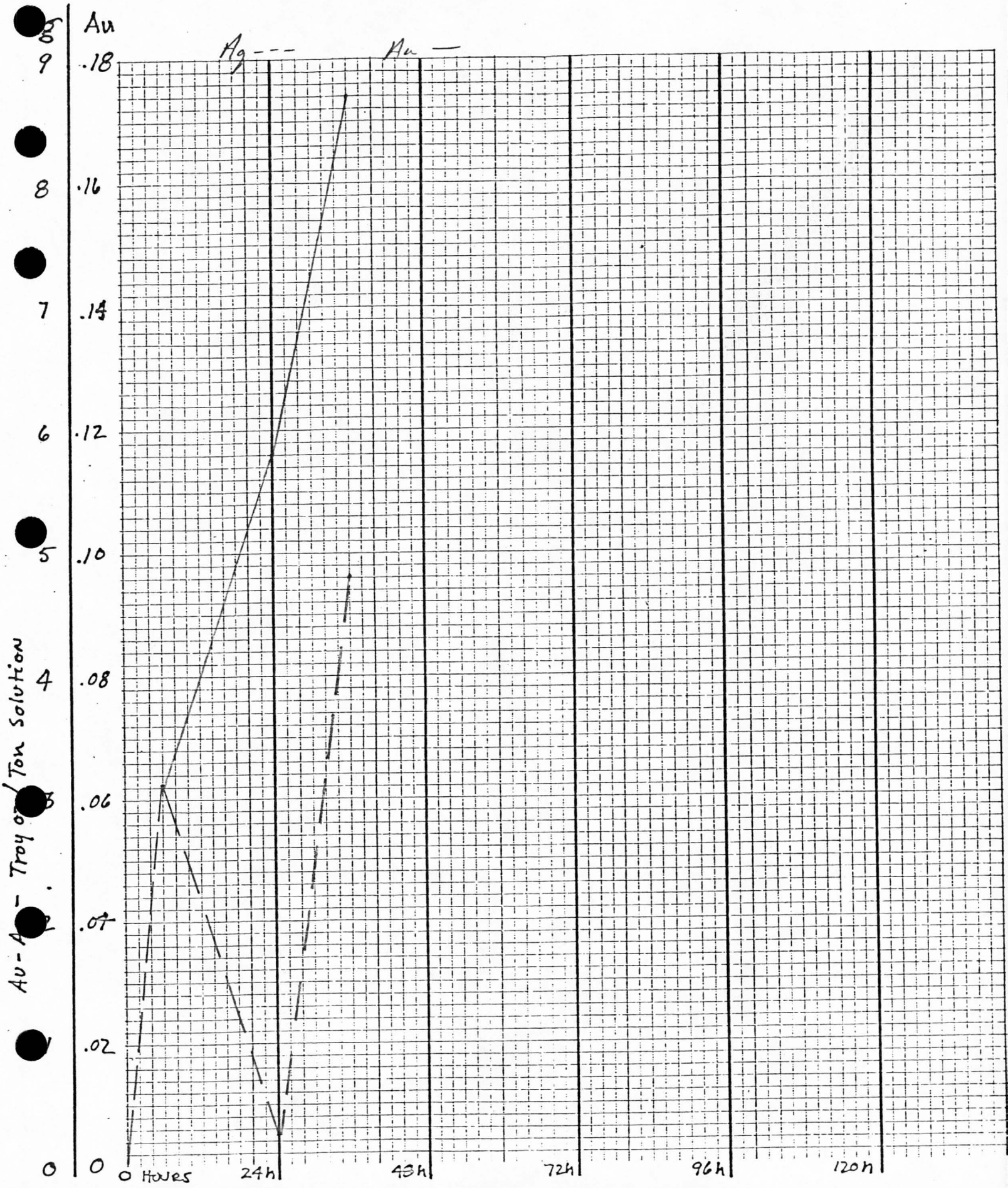
STARTING DATE: 8/22/79

SAMPLE # B-13



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # B-13



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-14 Wet Wt. 69.0 (24 hrs) 66.5 (36 hrs) %H_2O Dry Wt. 50

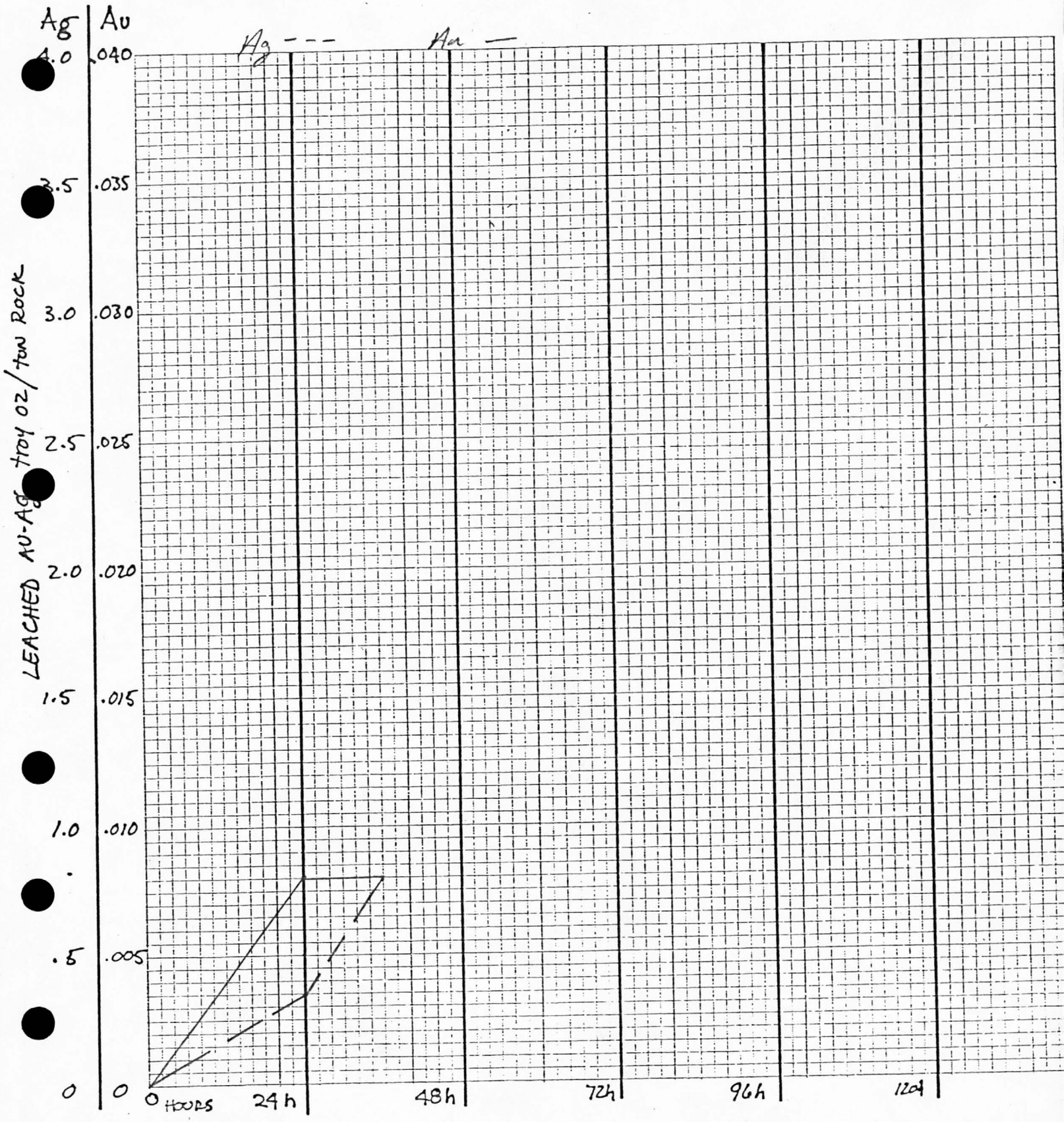
Aug 22, 1979 8:30 AM

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS.		.001	.67				1.8		12			0.2	
24	19.0	.020	.91	.38	.008	.35	1.6		12			0.4	
36	16.5	.026	2.40	.33	.008	.79	1.2		11			0.8	

BARREL TEST

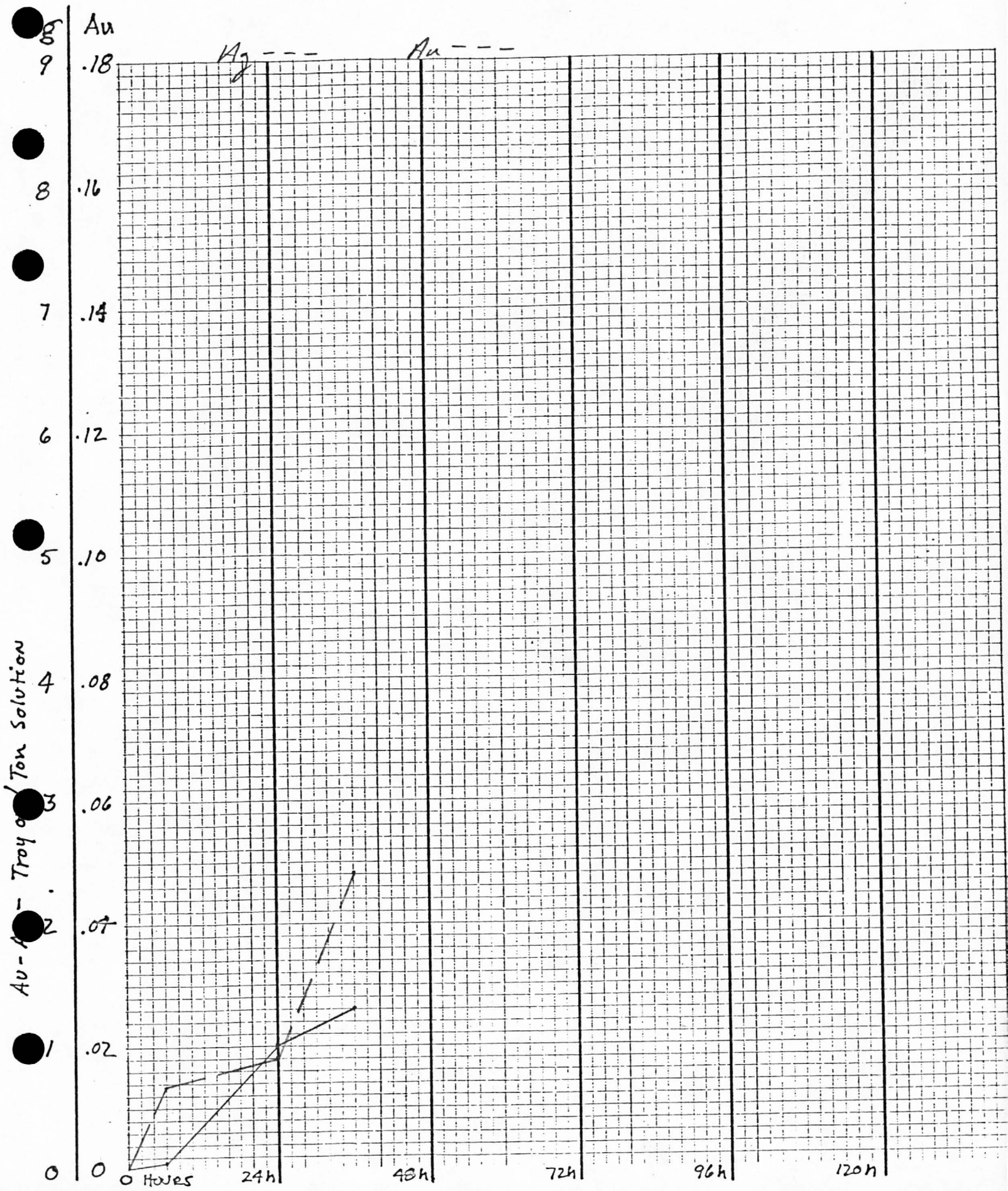
STARTING DATE: 8/22/77

SAMPLE # B-14



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # B-14



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-15 Wet Wt. 65.5 (24hr) 62.0 (36hr) %H_2O Dry Wt. 50 lbs

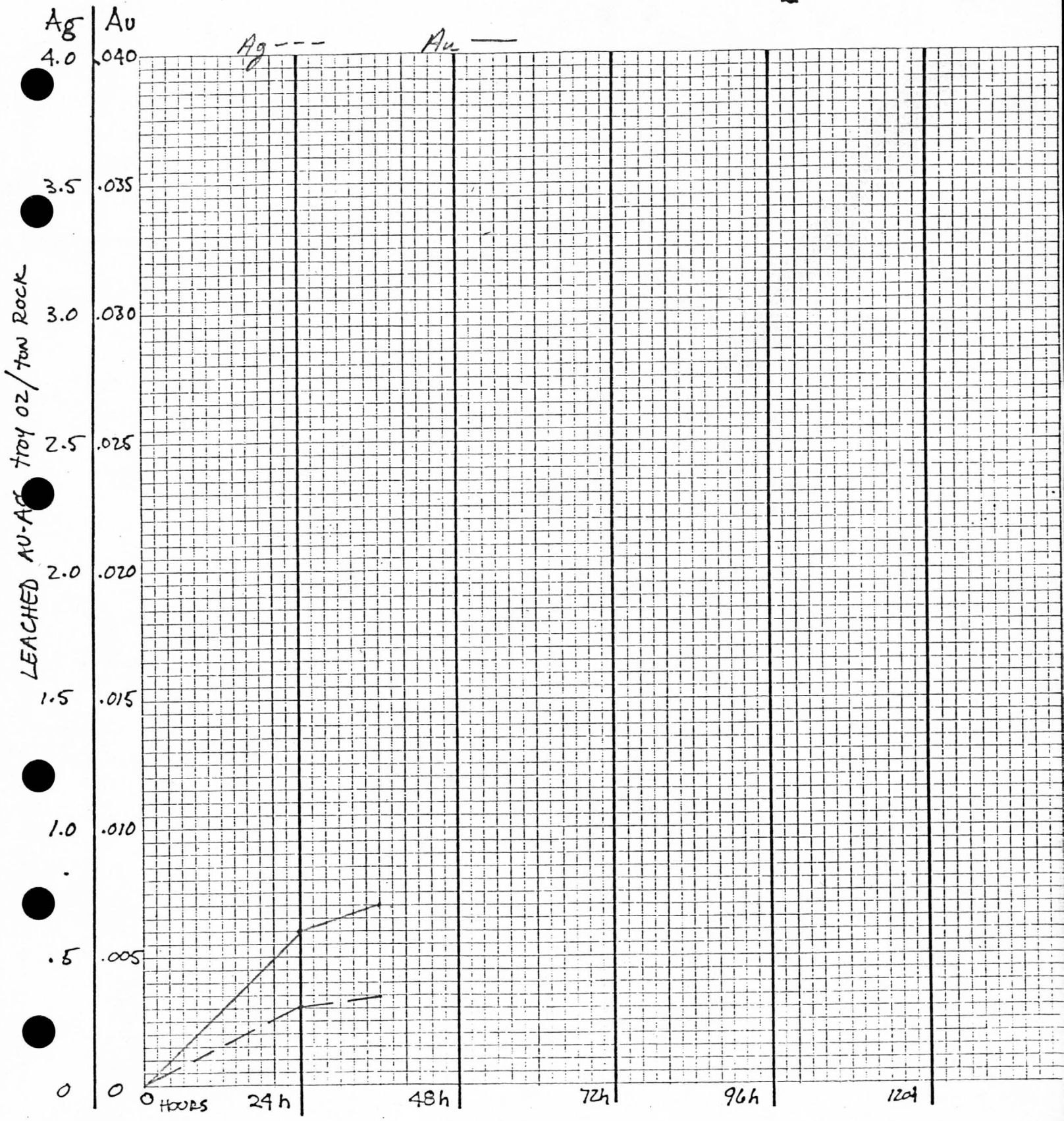
Aug 22, 1979 8:30 pm

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.008	.53				1.8		11			0.2	
24	15.5	.020	.98	.31	.006	.30	1.4		11			0.6	
36	12.0	.029	1.40	.24	.007	.34	1.0		11			1.0	

BARREL TEST

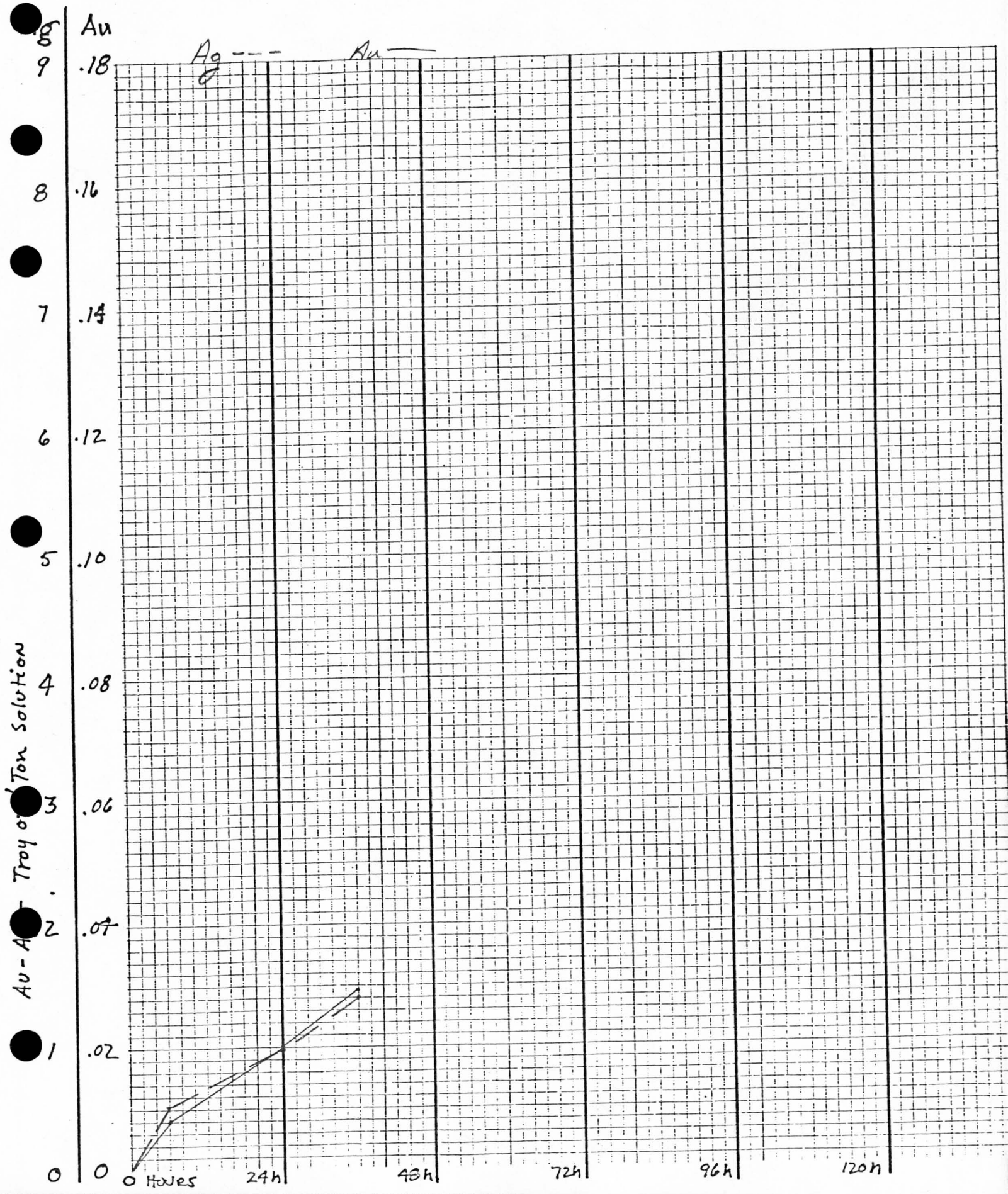
STARTING DATE: 8/22/79

SAMPLE # B-15



STARTING DATE: 8/22/79

BARREL TEST SAMPLE # 8-15



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6 lbs
Total

Sample Identification B-16 Wet Wt. 64.0 (24hr) 61.5 (36hr) $\%H_2O$ Dry Wt. 50 lbs

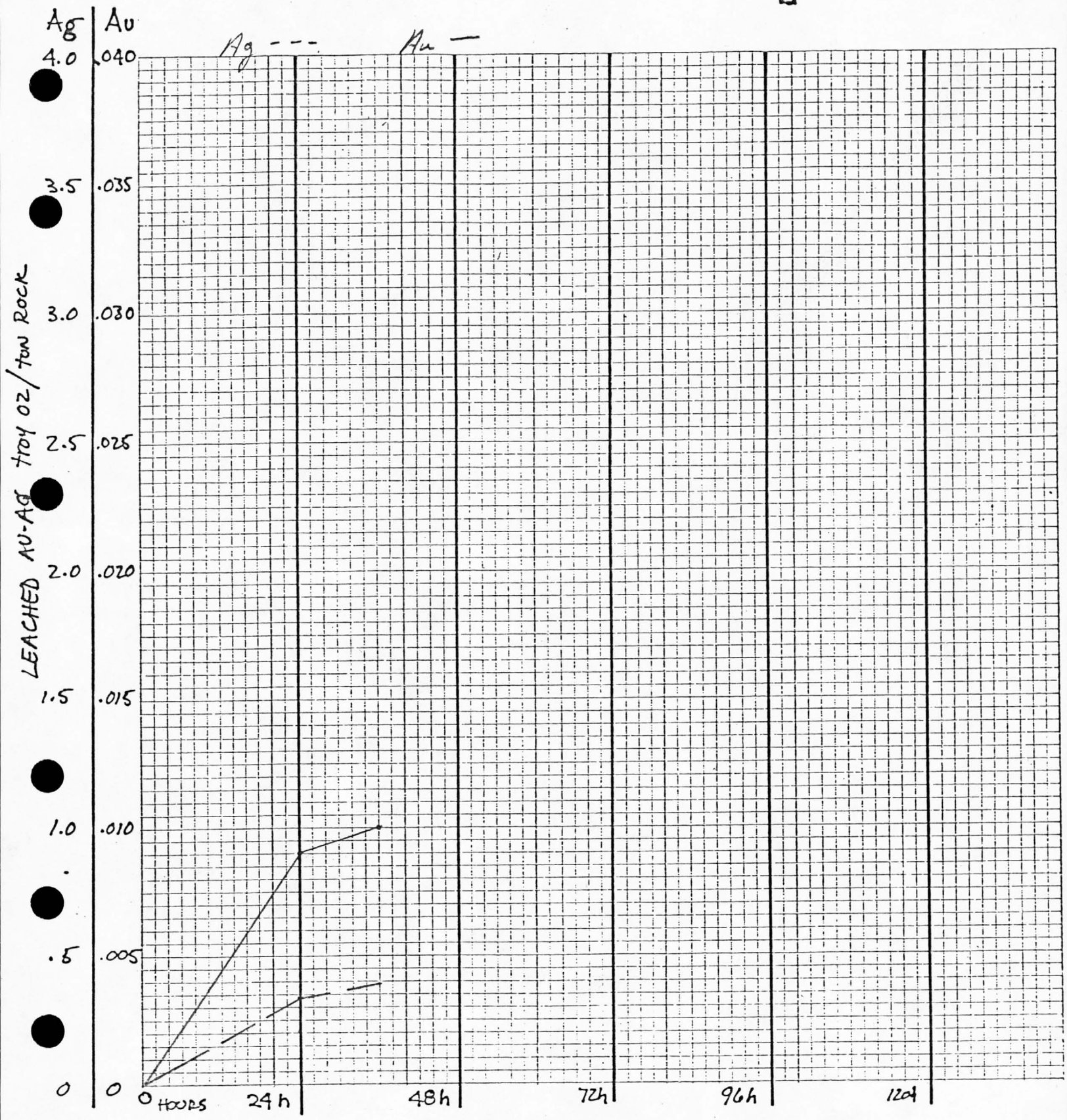
Aug 22, 1979 8:30 AM

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
6 HRS		.023	.90				1.7		11			0.3	
24	14.0	.034	1.18	.28	.009	.33	1.5		11			0.5	
36	11.5	.046	1.66	.23	.01	.38	1.0		11			1.0	

BARREL TEST

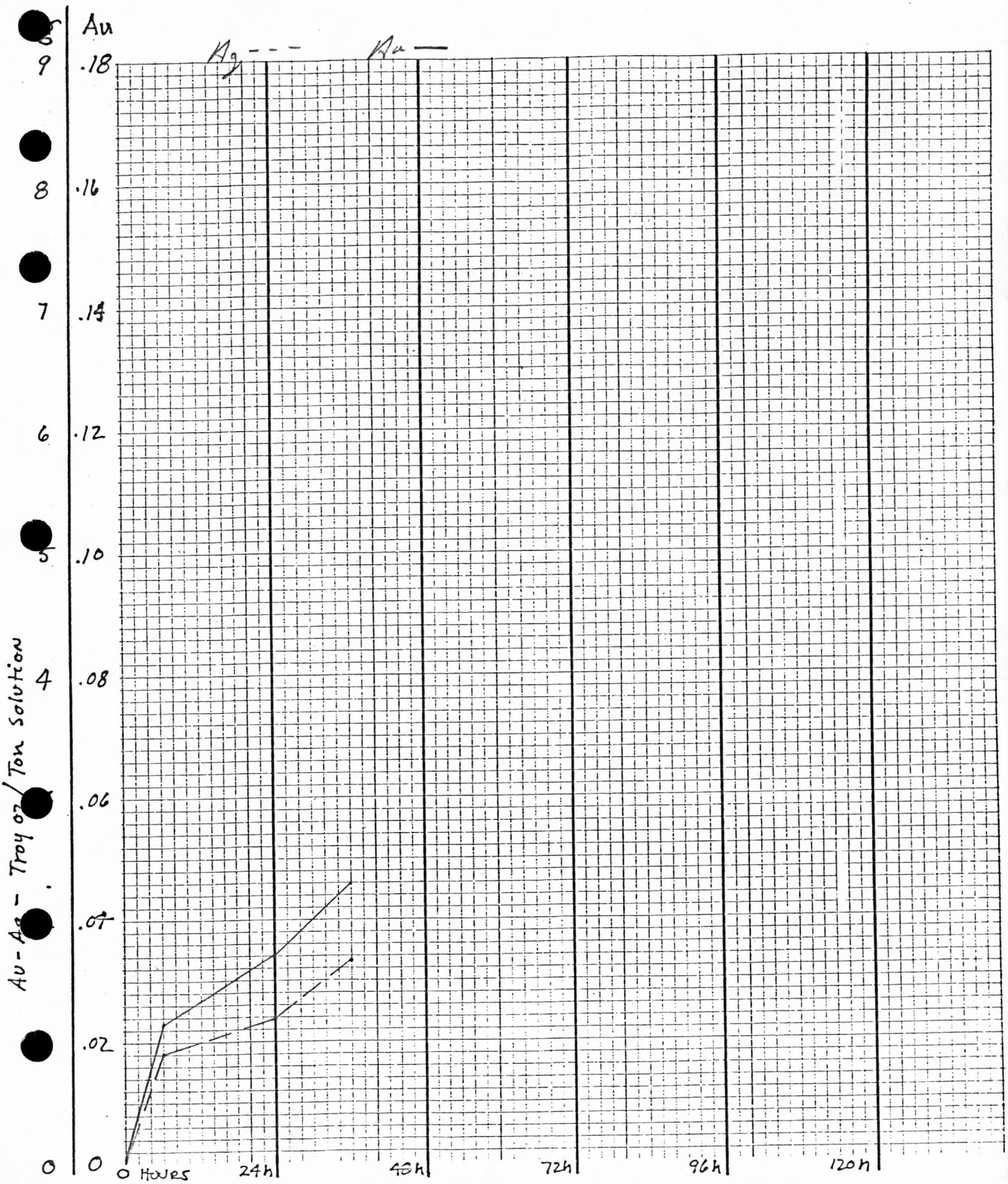
STARTING DATE: 8/22/79

SAMPLE # B-16



STARTING DATE: 8/22/72

BARREL TEST SAMPLE # B-16



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-17 Wet Wt. 65.5 (24 hrs) 59.0 (48 hr) $\%H_2O$ Dry Wt. 50

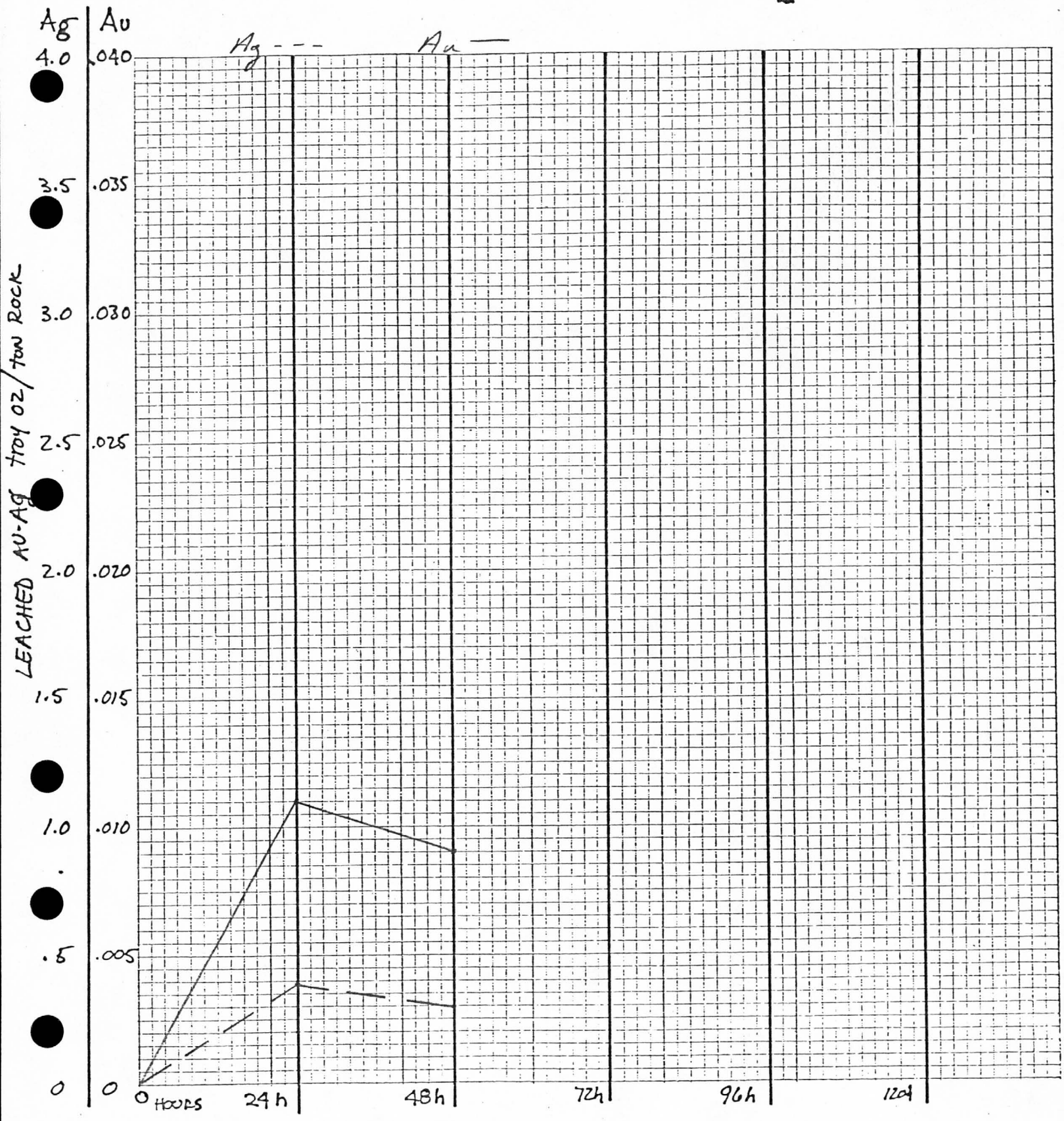
Start 10:30 Am Aug 23, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	15.5	.037	1.24	.31	.011	.38	0.8		11			1.2	
48	9.0	.052	1.62	.18	.009	.29	0.3		10			1.7	

BARREL TEST

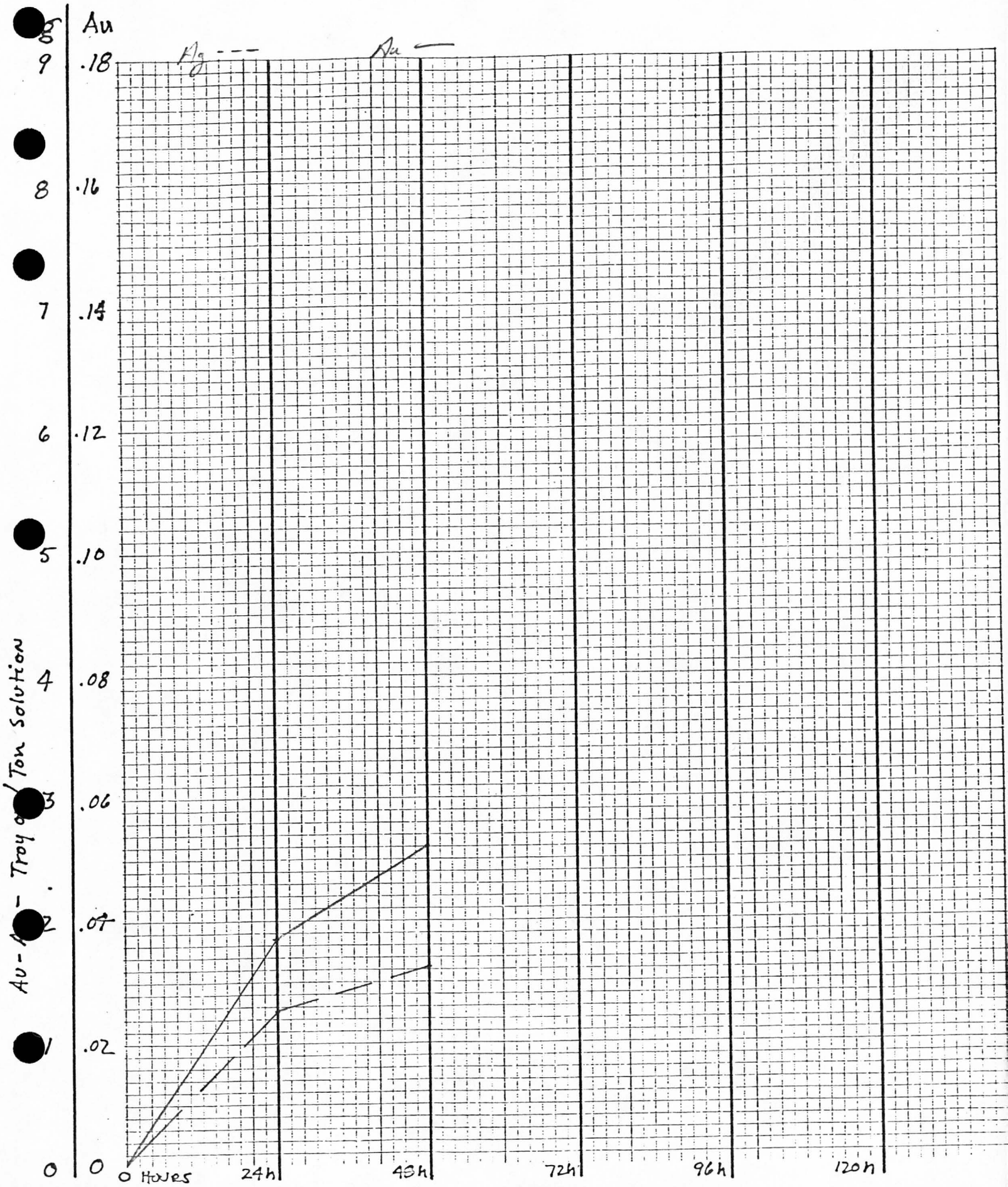
STARTING DATE: 8/23/77

SAMPLE # B-17



STARTING DATE: 8/23/79

BARREL TEST SAMPLE # 15-17



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-18 Wet Wt. 64.0 (24hr) 61.5 (48hr) %H_2O Dry Wt. 50

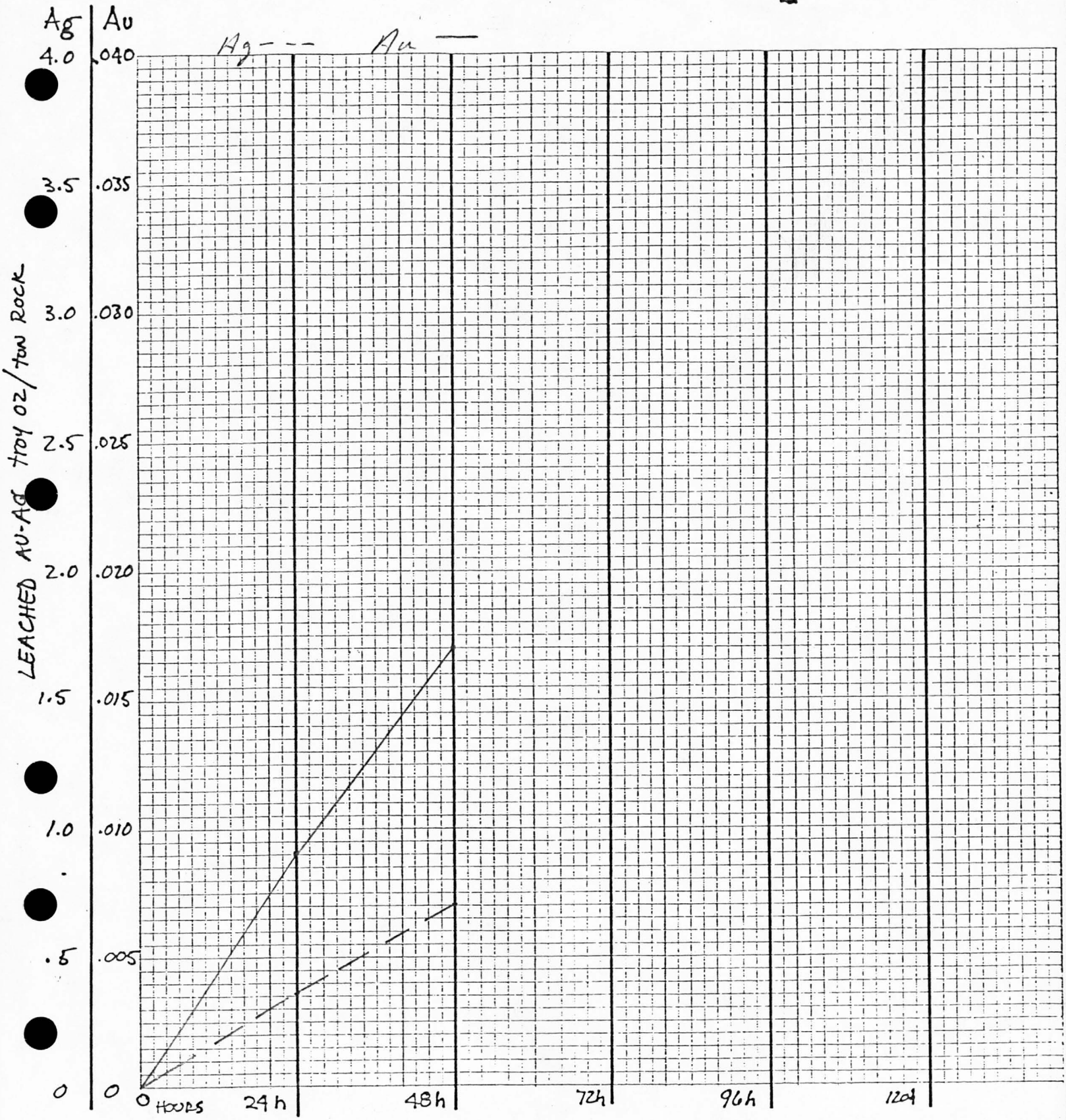
START 10:30 AM Aug 23, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	14.0	.031	1.30	.28	.009	.36	0.7		11			1.3	
48	11.5	.075	3.04	.23	.017	.70	0.6		11			1.4	

BARREL TEST

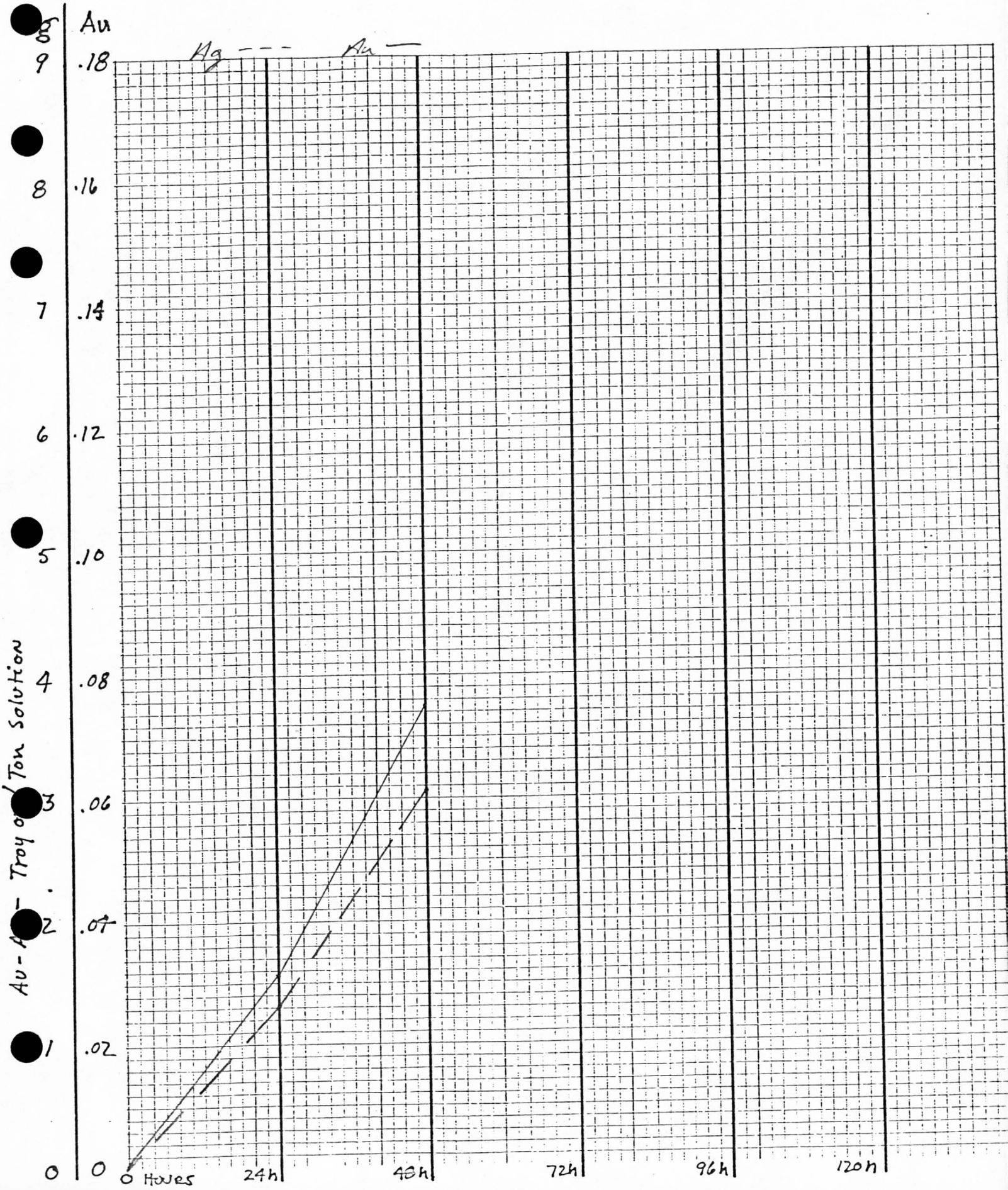
STARTING DATE: 8/23/79

SAMPLE # 18-18



STARTING DATE: 8/23/79

BARREL TEST SAMPLE # 15-18



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-18 Wet Wt. 64.0 (24hr) 61.5 (48hr) %H_2O Dry Wt. 50

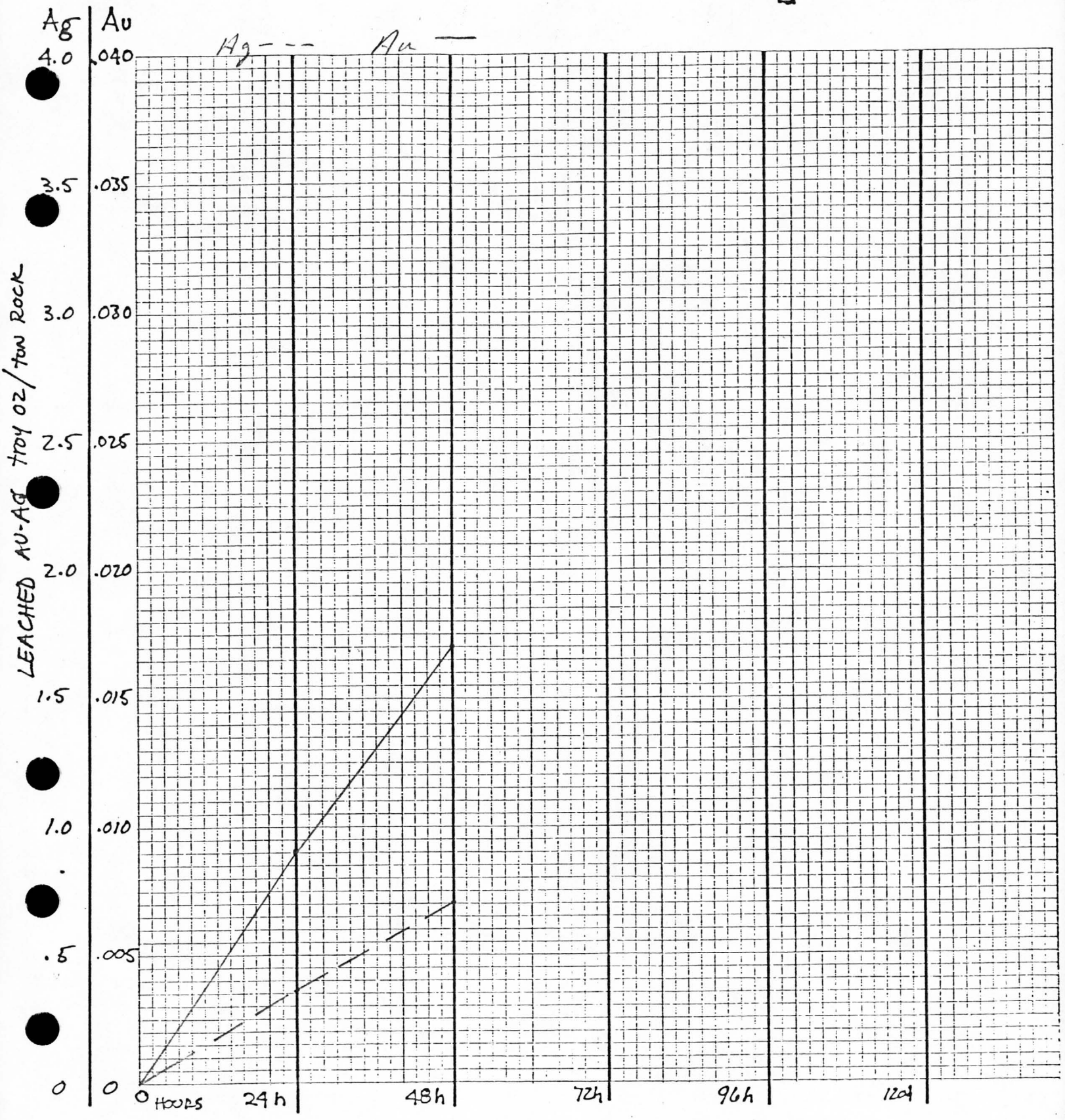
Start 10:30 AM Aug 23, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	14.0	.031	1.30	.28	.009	.36	0.7		11			1.3	
48	11.5	.075	3.04	.23	.017	.70	0.6		11			1.4	

BARREL TEST

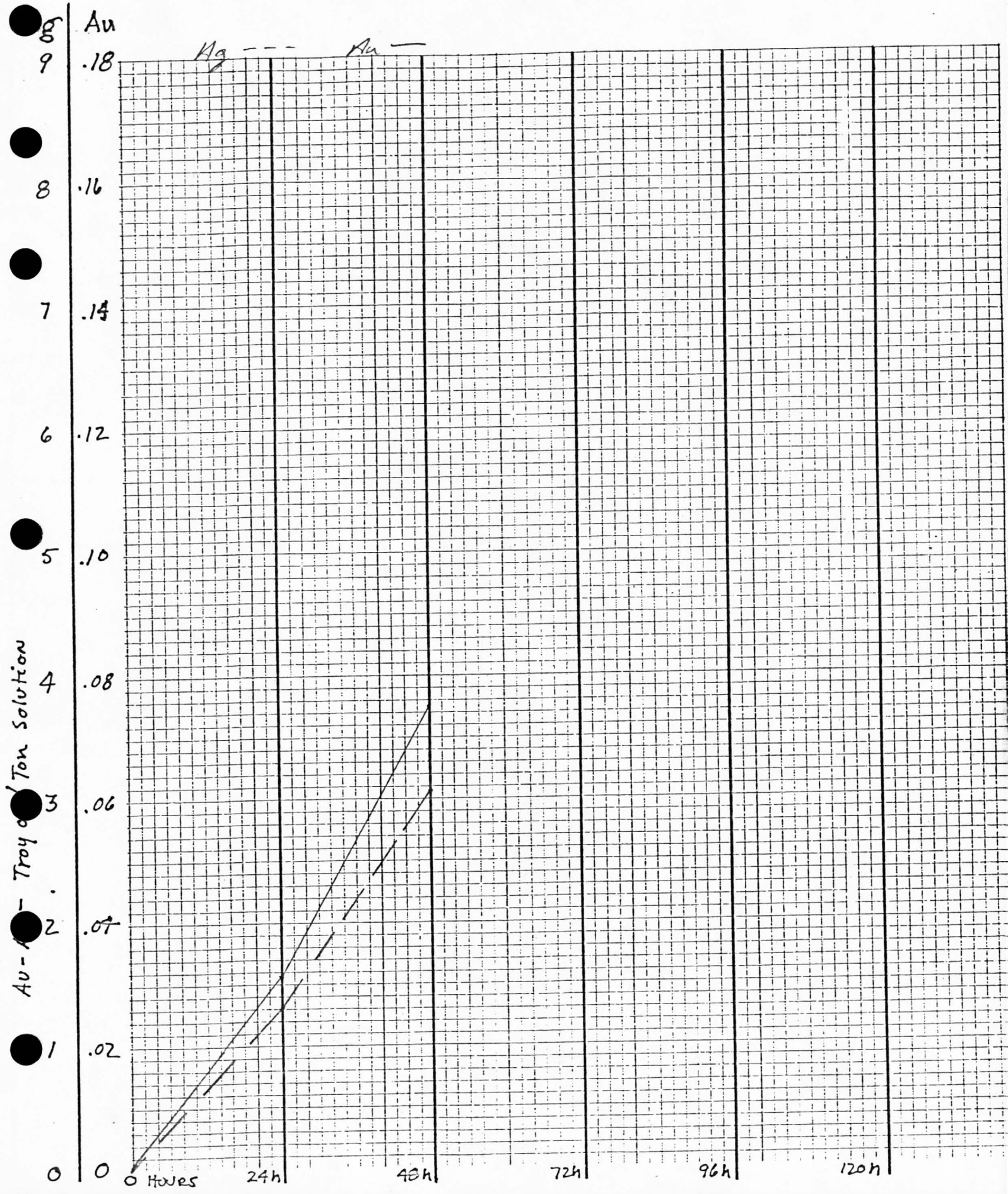
STARTING DATE: 8/23/79

SAMPLE # 18-18



STARTING DATE: 8/23/79

BARREL TEST SAMPLE # 15-18



BARREL TEST LEACH DATA

P-418

Tar. Wt. 6
Total

Sample Identification B-19 Wet Wt. 63.5 62.0 %H_2O Dry Wt. 50
24 hrs 48 hrs

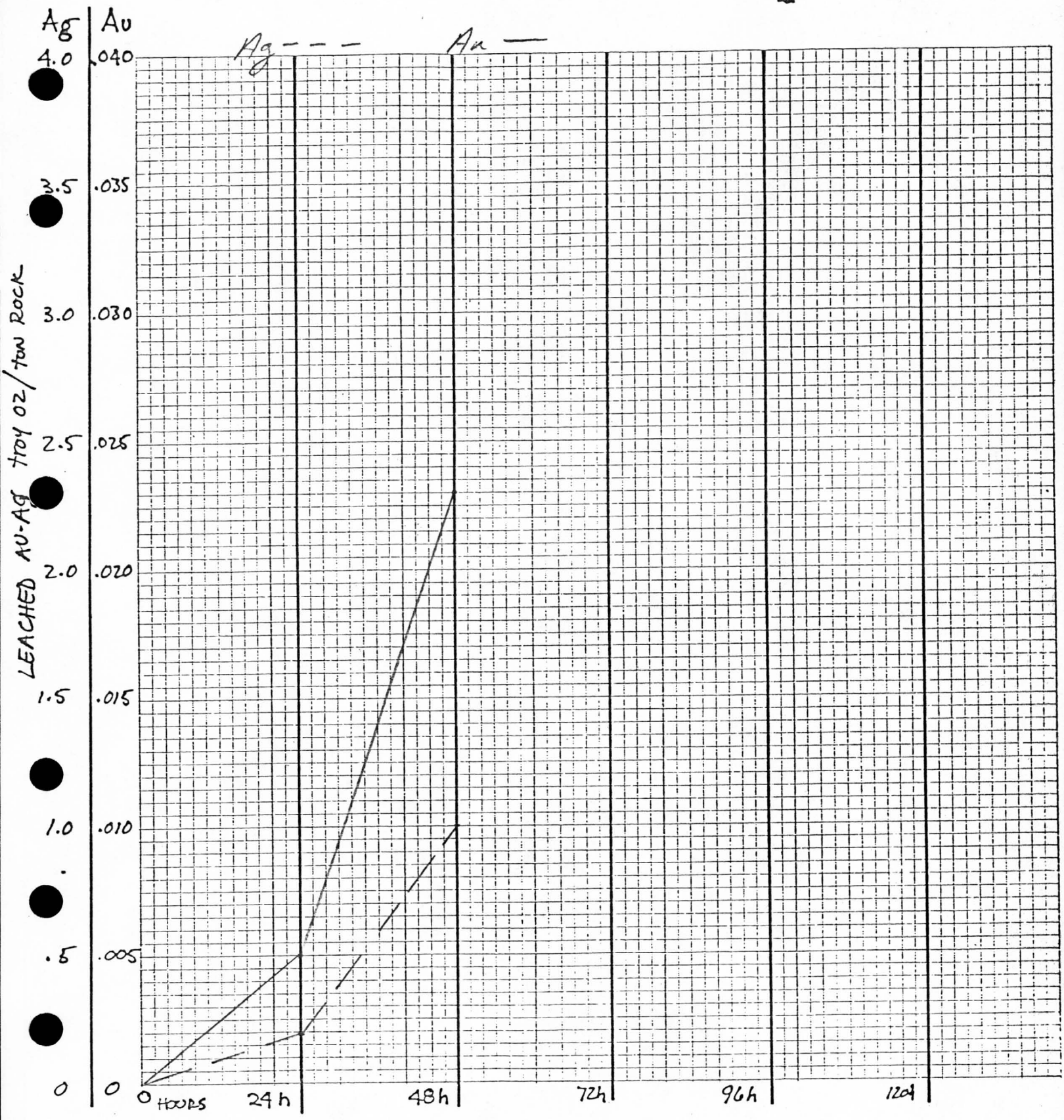
Start 10:30 AM Aug 23, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	13.5	.020	.44	.27	.005	.19	0.8		12			1.2	
48	12.0	.098	4.16	.24	.023	1.0	0.7		11			1.3	

BARREL TEST

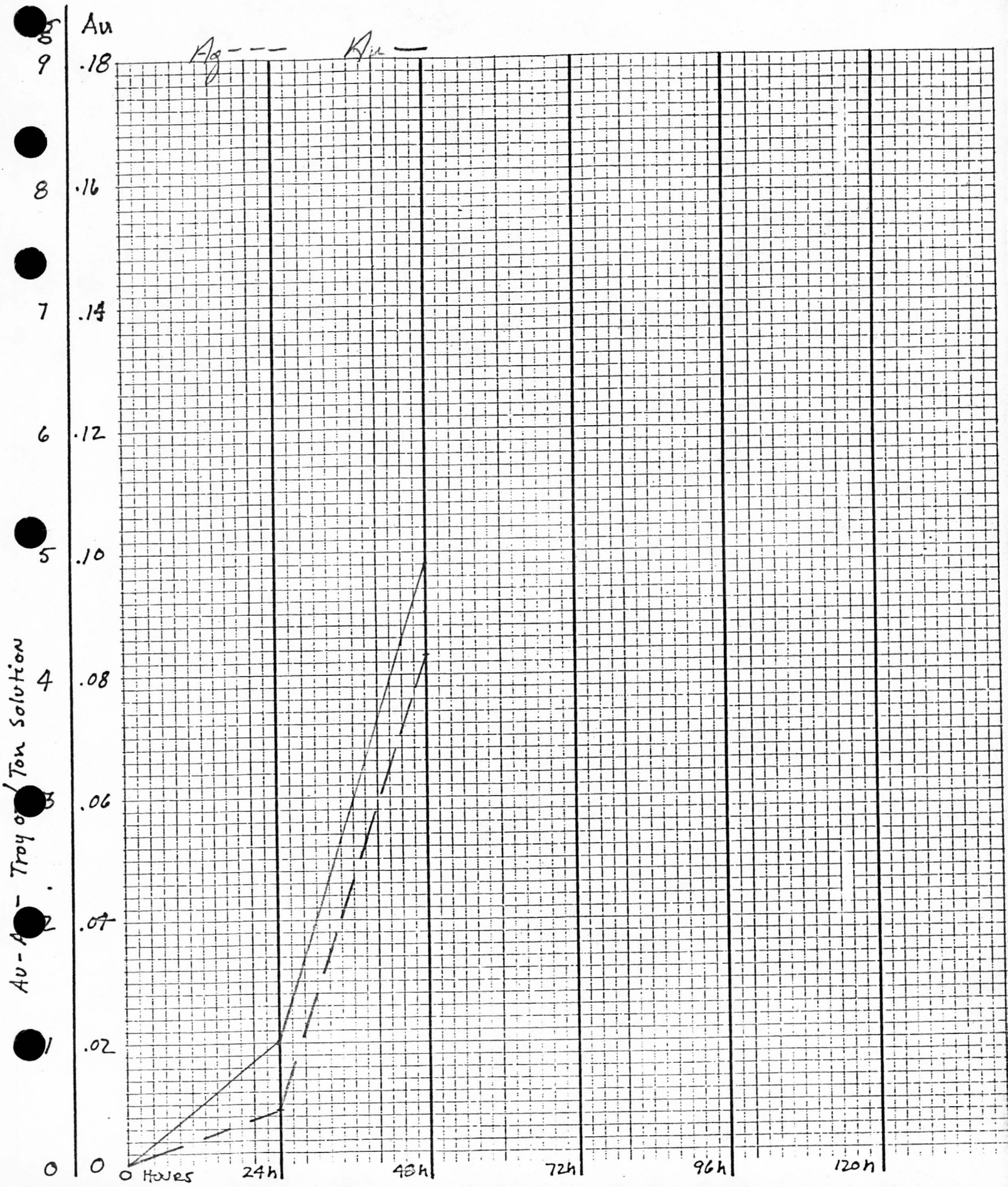
STARTING DATE: 8/23/79

SAMPLE # B-11



STARTING DATE: 8/23/79

BARREL TEST SAMPLE # B-19



BARREL TEST LEACH DATA

Loads 0-6

P-418

Tar. Wt. 6

Total

Sample Identification B-20

Wet Wt. 67.5 (24hr) 65.0 (48hr) 23.5 (72hrs) 6 17.5

%H_2O

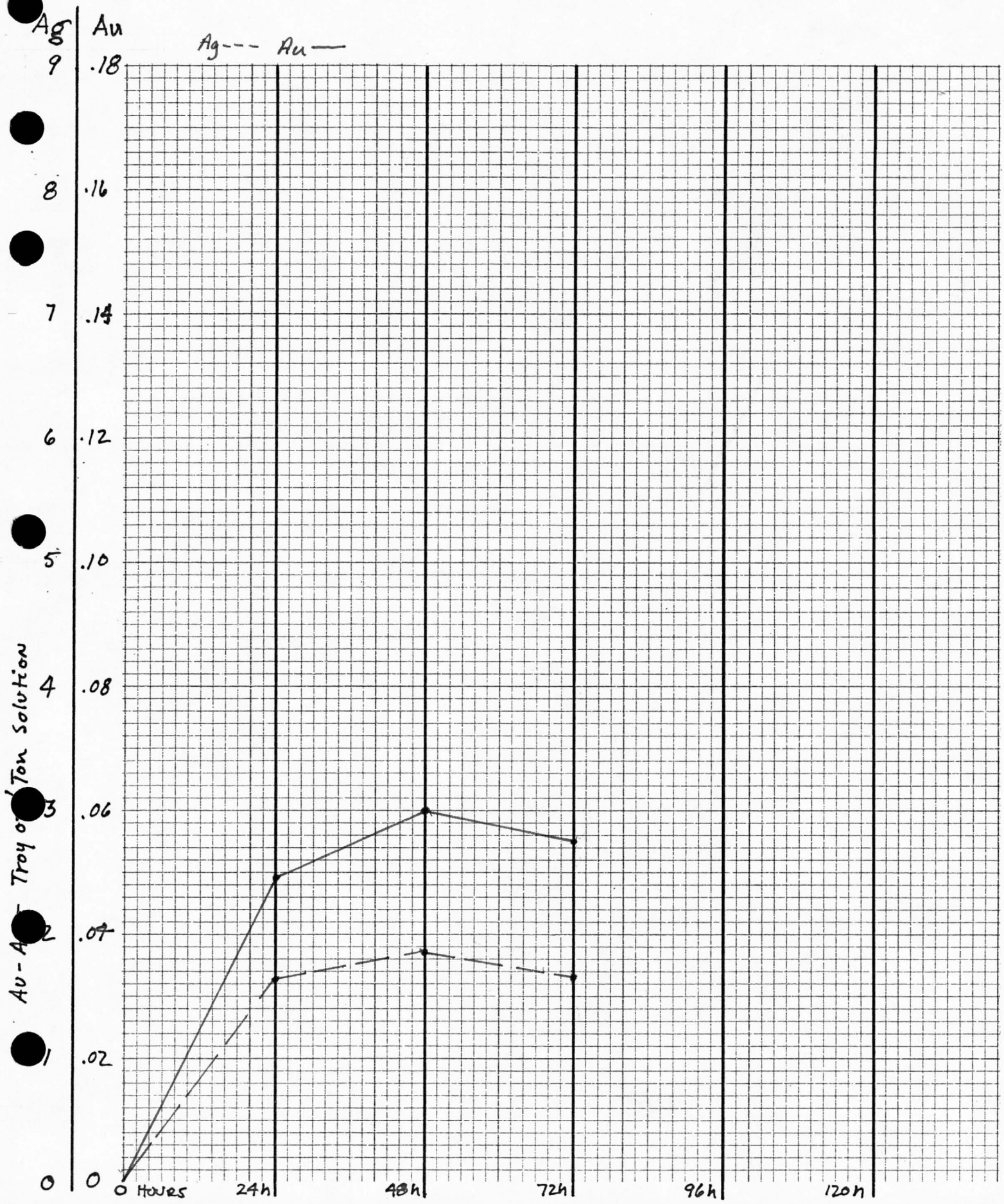
Dry Wt. 50

Start 2:30 PM Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	17.5	.049	1.62	.35	.017	.57	0.4		11			1.6	
48	15.0	.060	1.84	.30	.018	.55	0.4		11	6gr		1.6	
72	17.5	.055	1.66	.35	.019	.58	0.8		10			1.2	

STARTING DATE: 8/27/79

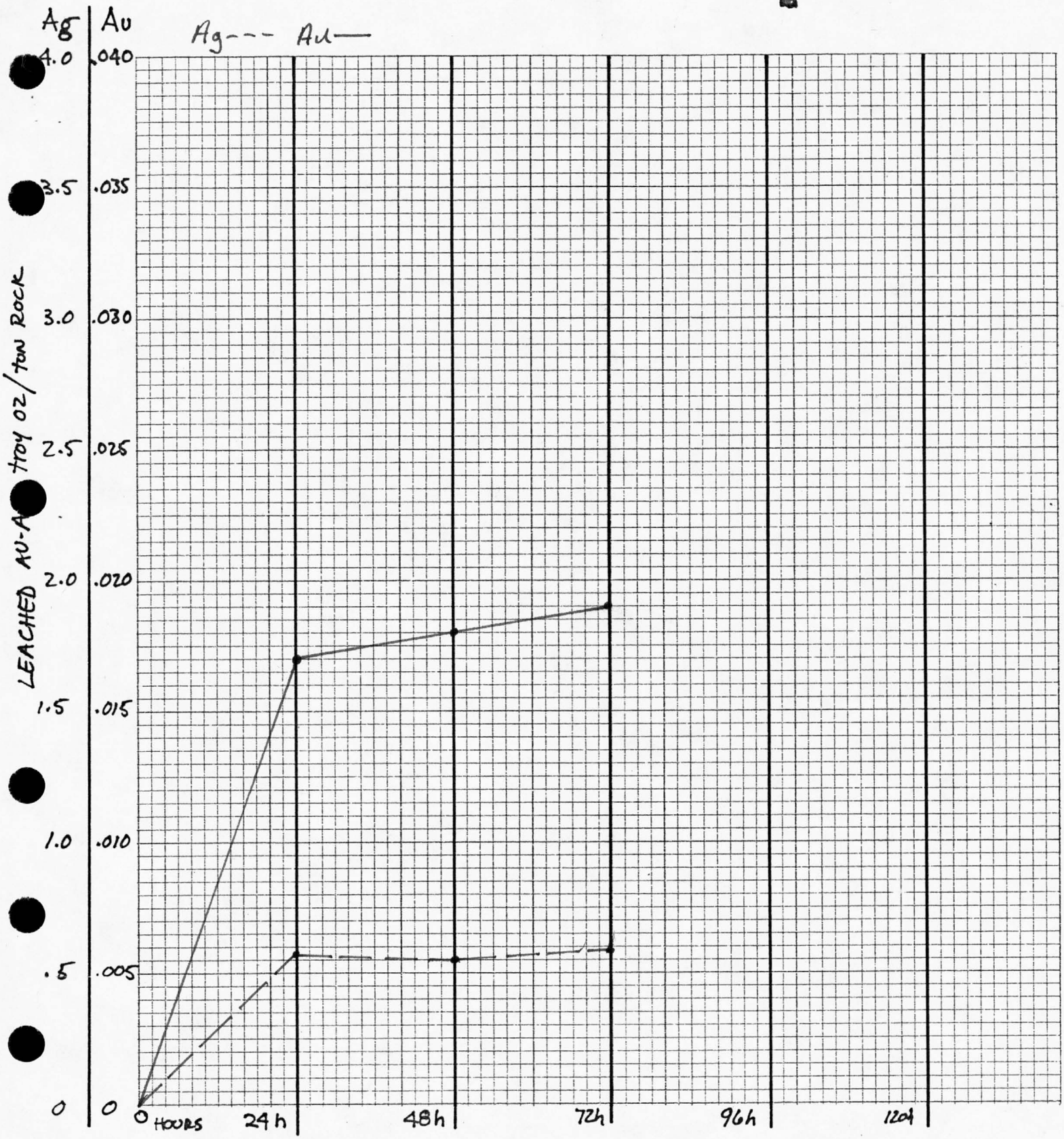
BARREL TEST SAMPLE # B-20



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-20



BARREL TEST LEACH DATA

P-418

Loads 6-12

Tar. Wt. 6

Total

Sample Identification B-21

Wet Wt. 66.0 (24hr) 63.5 (48hr) 23.5 72hrs − 6 = 17.5

%H_2O

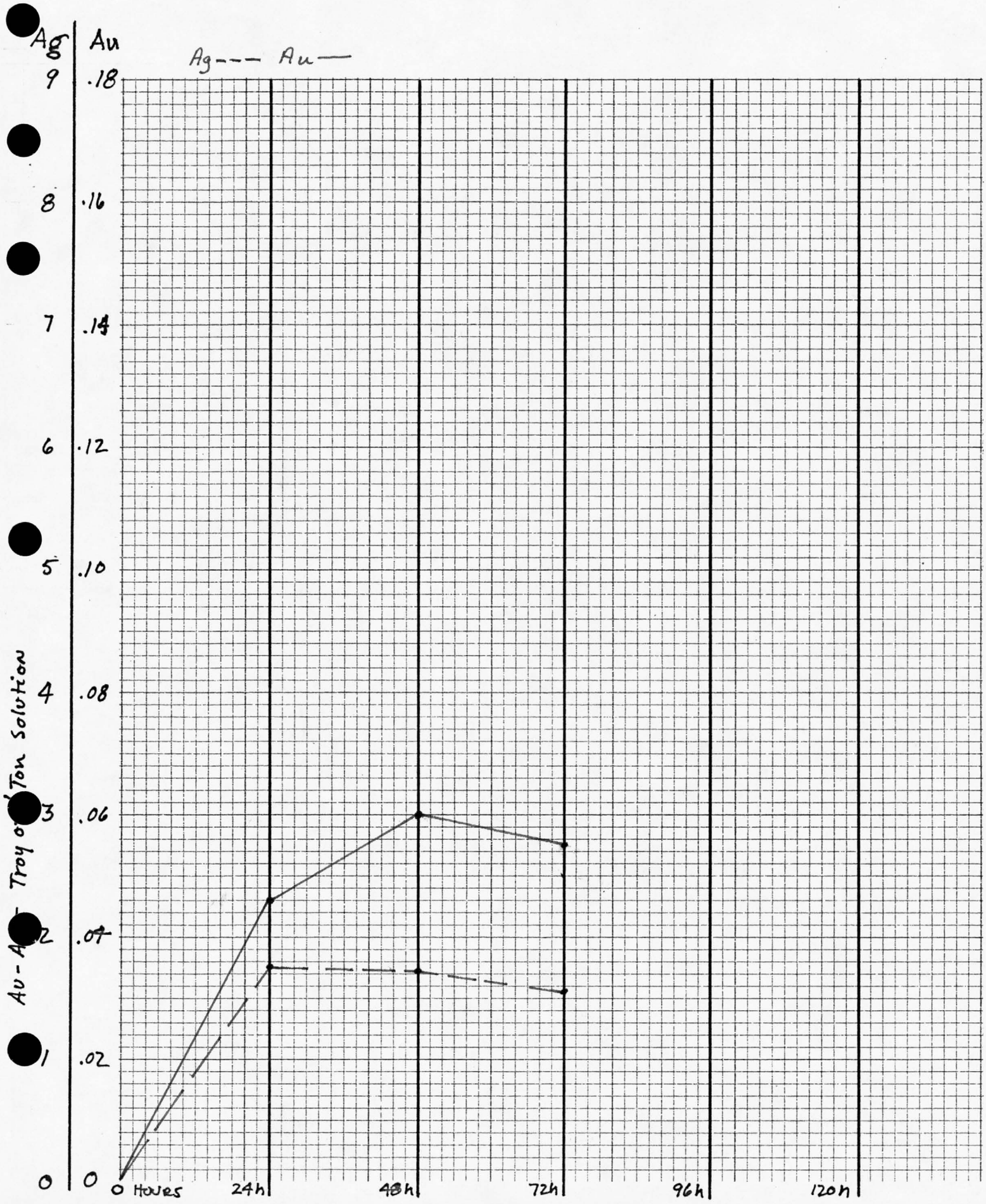
Dry Wt. 50

Start 2:30 PM Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	16	.046	1.76	.32	.015	.56	0.2		12			1.8	
48	13.5	.060	1.72	.27	.016	.46	0.1		11	8gr	3gr	1.9	
72	17.5	.055	1.56	.35	.019 # 5.70	.55 5.50	1.0		12			1.0	

STARTING DATE: 8/27/79

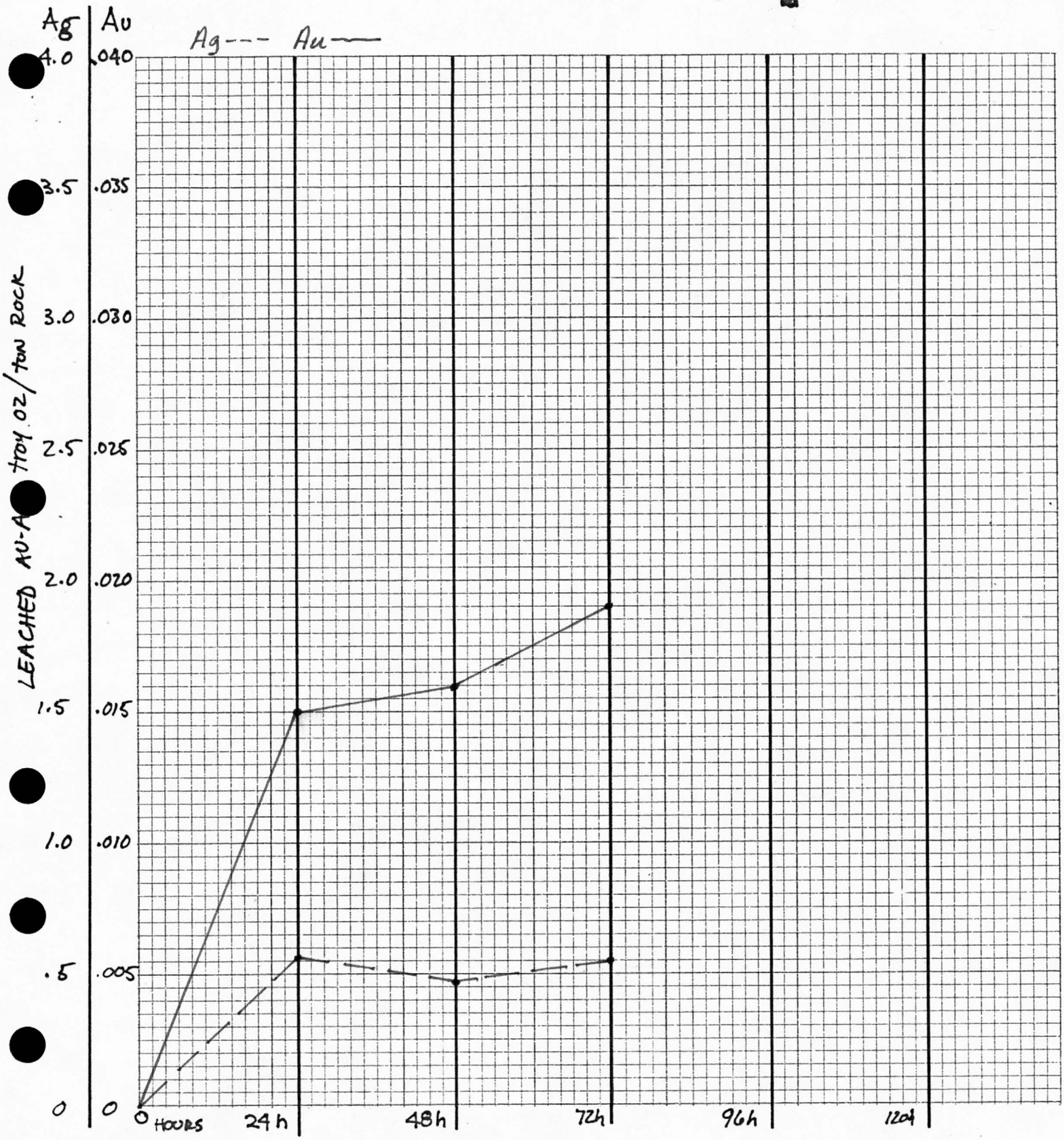
BARREL TEST SAMPLE # B-21



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-21



BARREL TEST LEACH DATA

P-418

Loads 12-18

Tar. Wt. 6

Total

Sample Identification B-22

Wet Wt. 67.5 (24hr) 65.0 (48hr) 73.0 (72hrs) -6 = 17.0

%H_2O

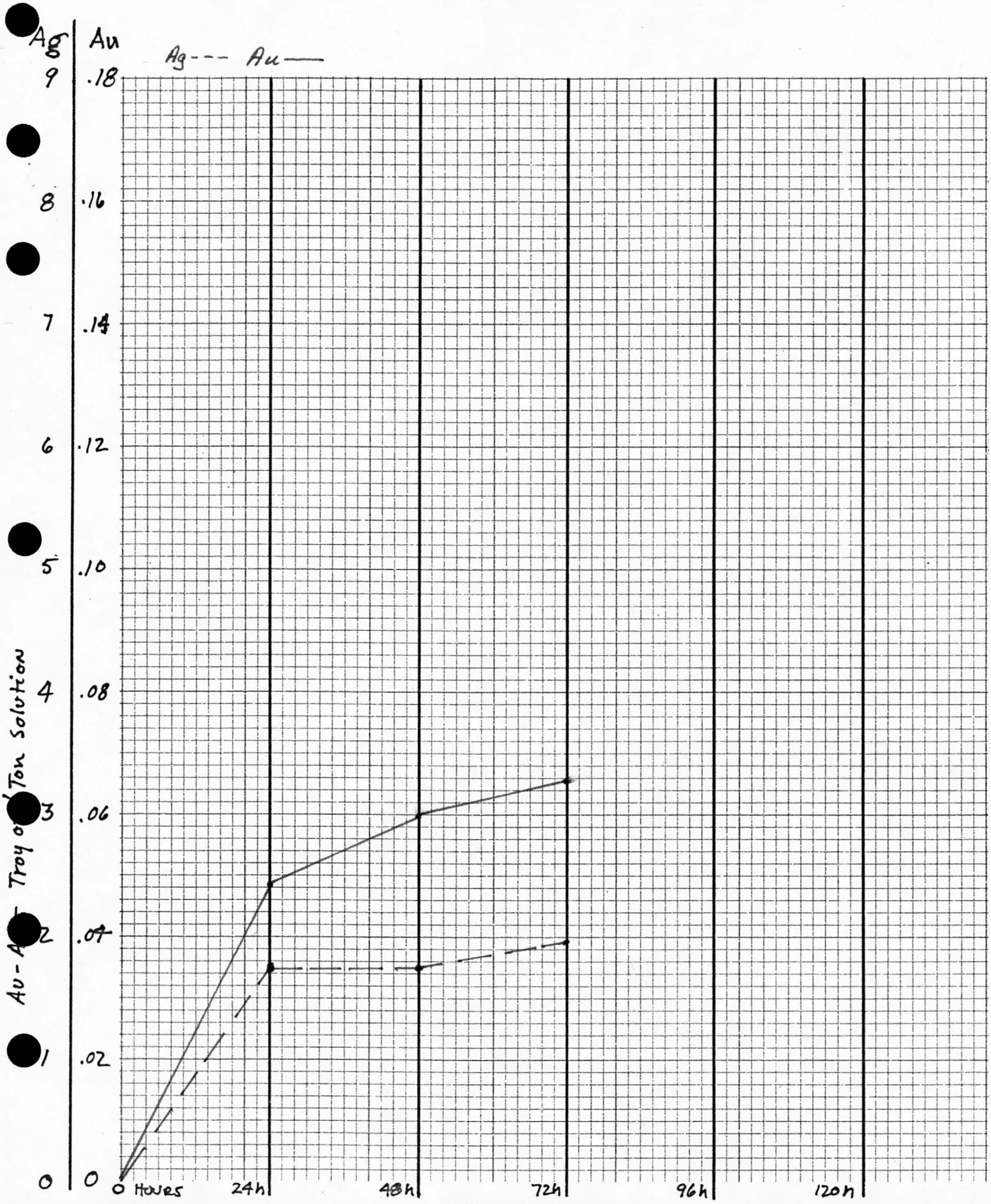
Dry Wt. 50

Start 2:30 PM Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	17.5	.049	1.78	.35	.017	.62	0.5		11			1.5	
48	15.0	.060	1.76	.30	.018	.53	0.3		11	6gr		1.8	
72	17.0	.066	1.96	.34	.022	.67	0.9		11			1.1	

STARTING DATE: 8/27/79

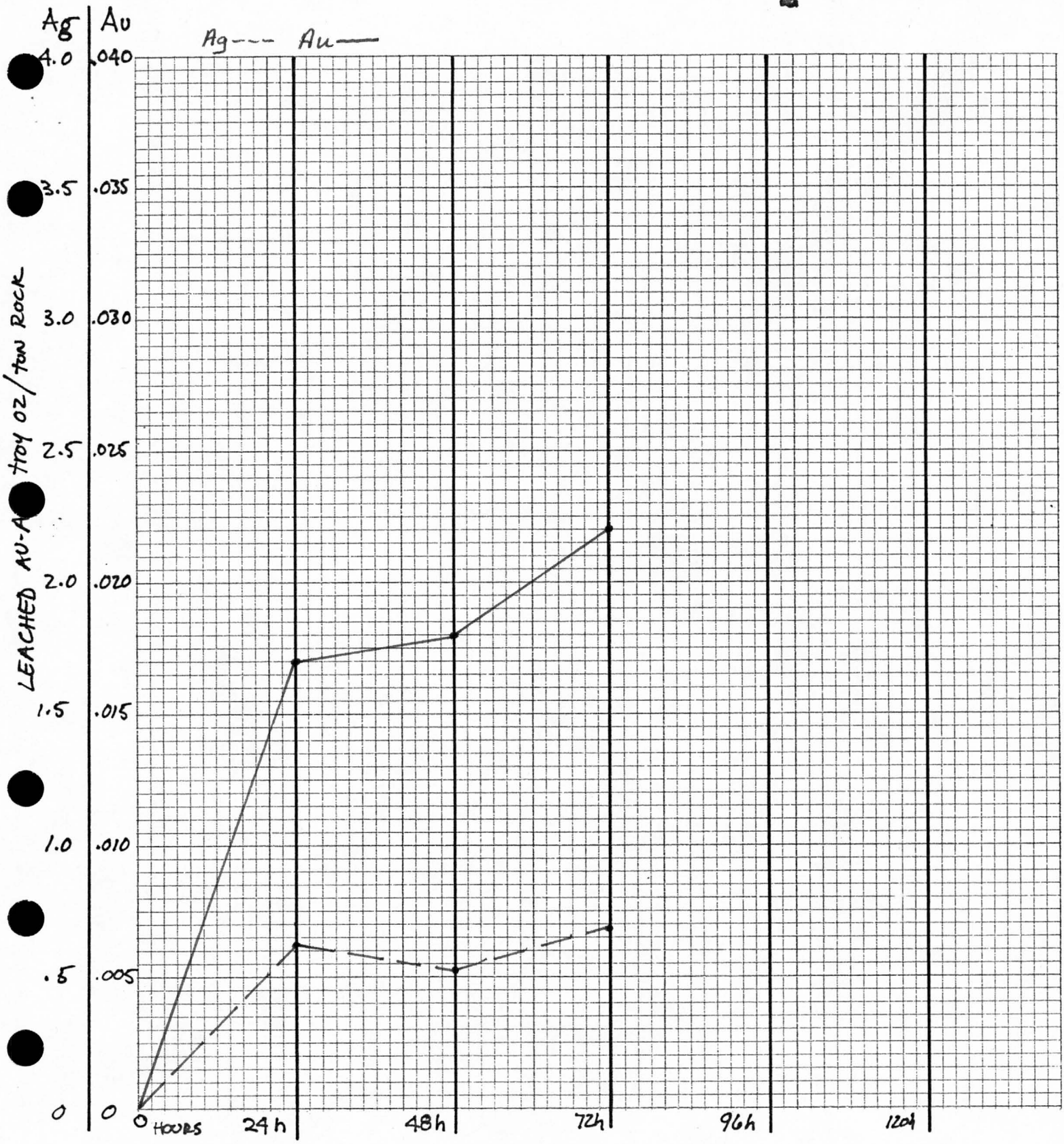
BARREL TEST SAMPLE # B-22



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-22



BARREL TEST LEACH DATA

P-418

Loads 18-24

Tar. Wt. 6
Total

72.0 72hrs
-6
16.0

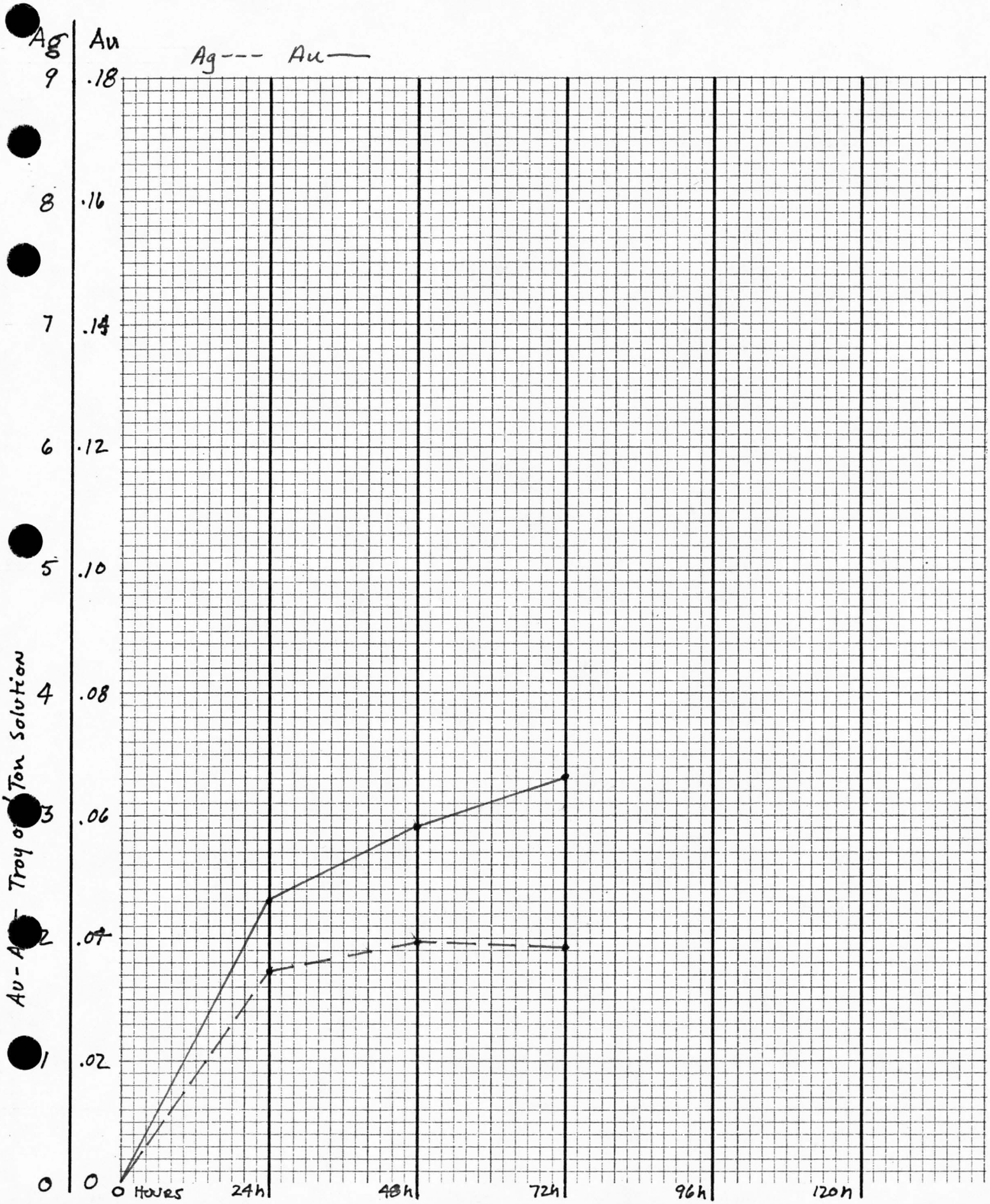
Sample Identification B-23 Wet Wt. 67.0 64.5 %H_2O Dry Wt. 50
24hr 48hr

Start 2:30PM Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	17.0	.046	1.72	.34	.016	.58	0.6		12			1.4	
48	14.5	.058	1.98	.29	.017	.57	0.2		11	69r		1.8	
72	16.0	.066	1.94	.32	@ 6.30 .021	@ 6.20 .62	0.7		11			1.3	

STARTING DATE: 8/27/79

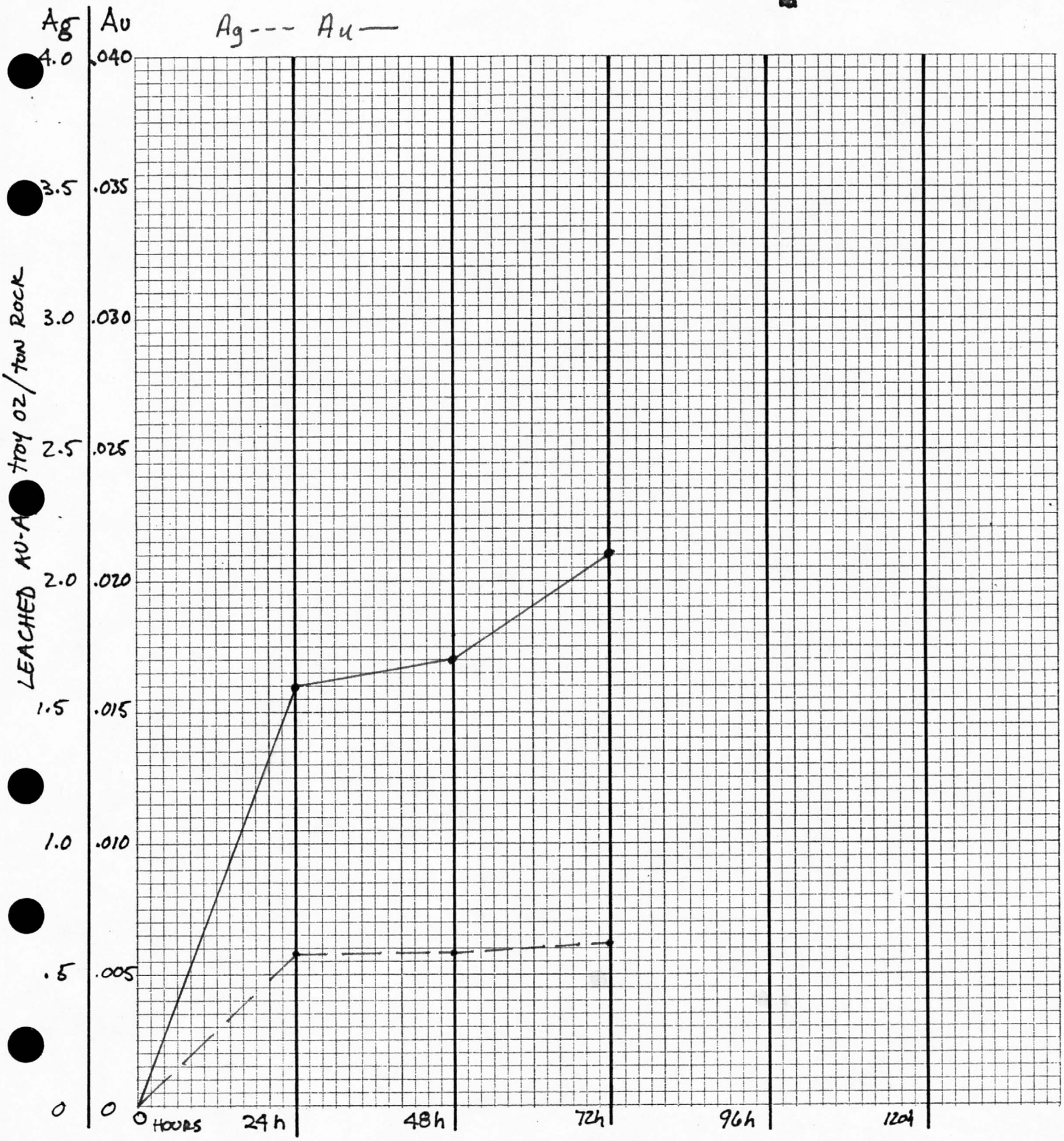
BARREL TEST SAMPLE # B-23



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-23



BARREL TEST LEACH DATA

P-418

Loads 24-30

Tar. Wt. 6

Total

72.5 72hrs
-6
1.65

Sample Identification B-24 Wet Wt. 67.0 64.0 %H_2O Dry Wt. 50

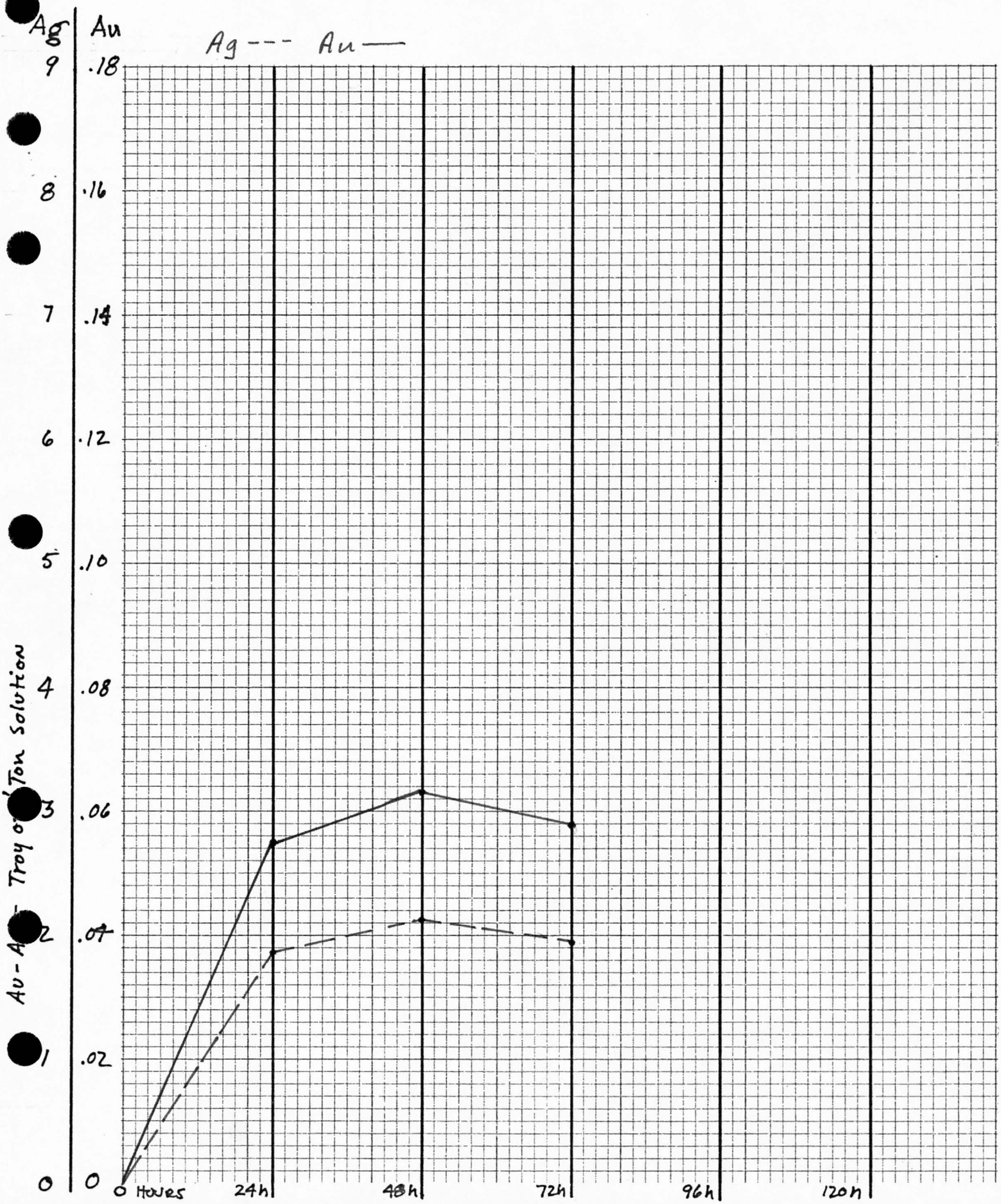
24hr 48hr

Start 1:30PM Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	17.0	.055	1.88	.34	.019 5.79	.64	0.4		11			1.6	
48	14.0	.063	2.12	.28	.018 5.40	.59	0.2		11	6gr		1.8	
72	16.5	.058	1.94	.33	.019	.64	0.9		10			1.1	

STARTING DATE: 8/27/79

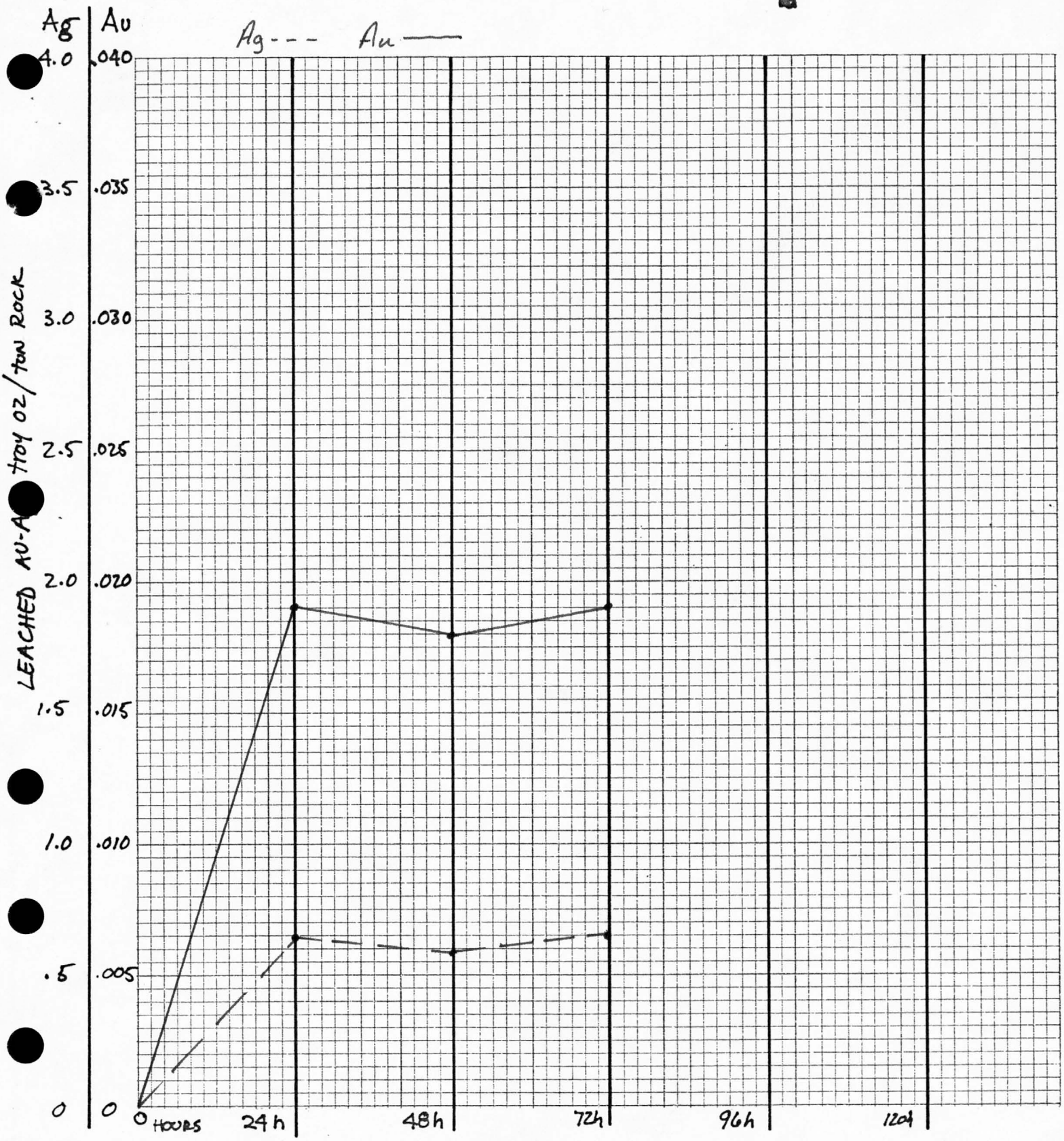
BARREL TEST SAMPLE # B-24



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-24



BARREL TEST LEACH DATA

P-418

Load 30-36

Tar. Wt. 6
Total

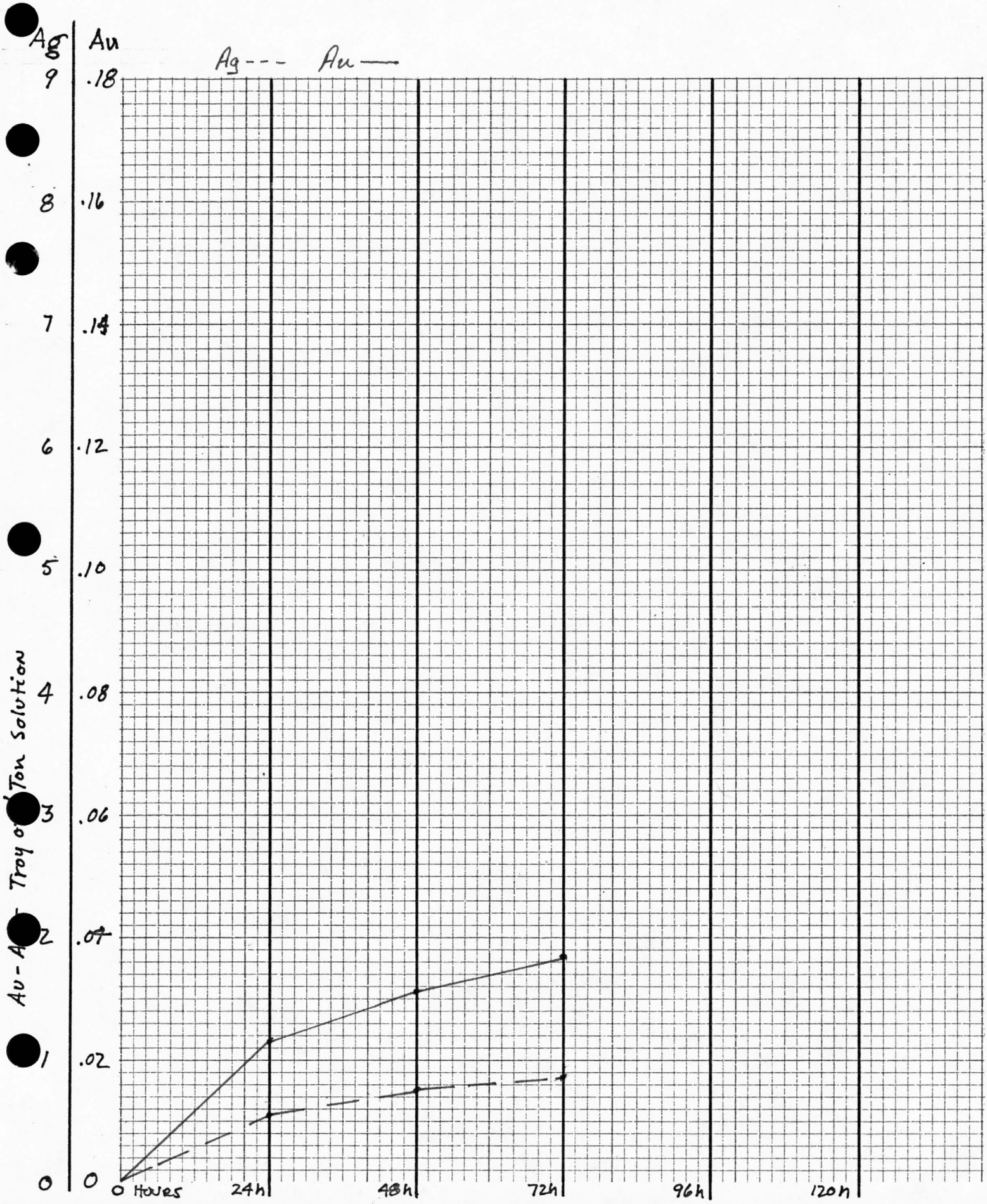
Sample Identification B-25 Wet Wt. 68.5 (24hr) 66.5 (48hr) 73.5 (72hrs) %H_2O Dry Wt. 50

Start 2:30 pm Aug 27, 1979

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	18.5	.023	.53	.37	.009	.20	0.8		12			1.2	
48	16.5	.031	.79	.33	.010	.26	0.5		11			1.5	
72	17.5	.037	.87	.35	.013	.30	0.2		11			1.8	

STARTING DATE: 8/27/79

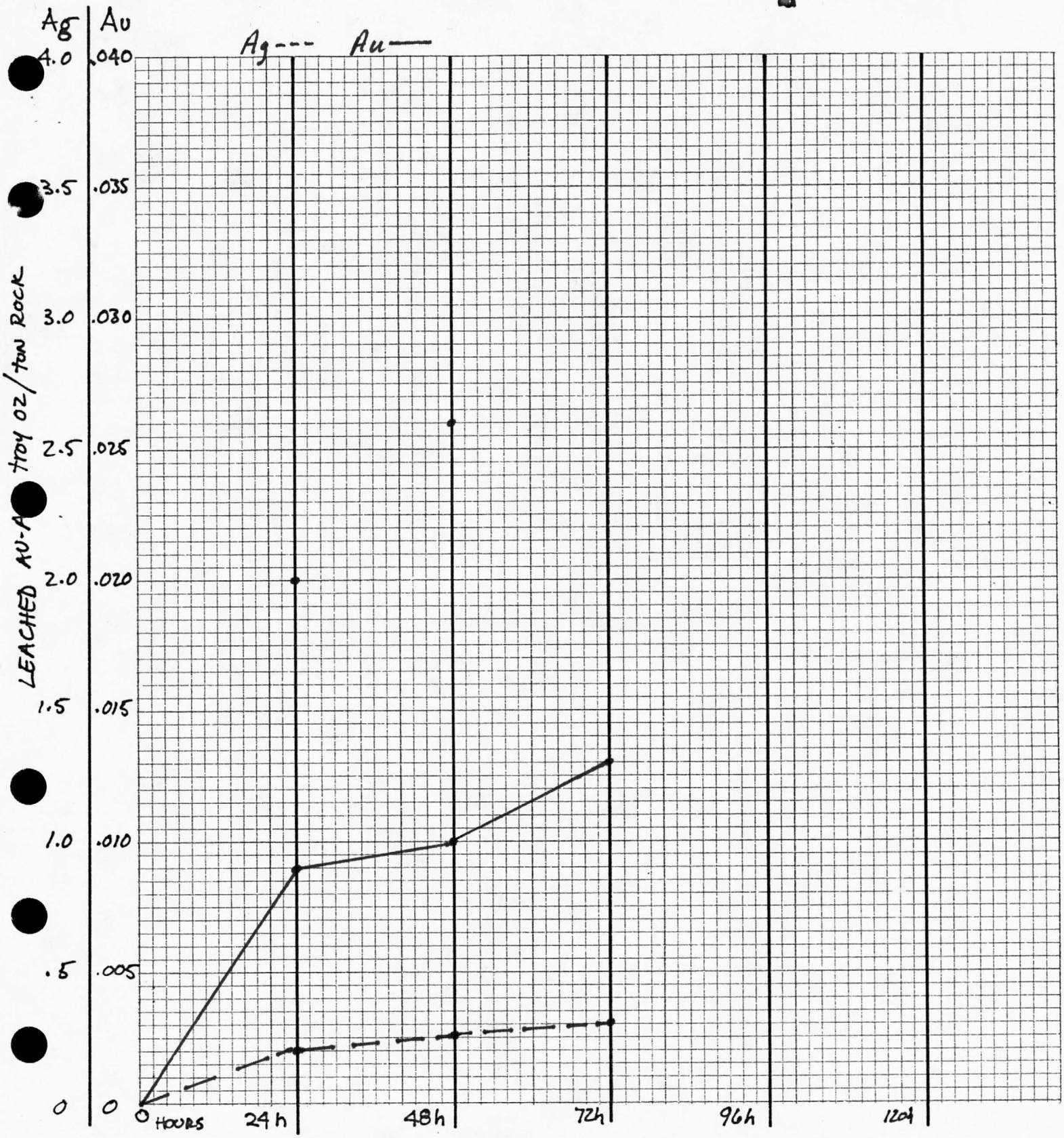
BARREL TEST SAMPLE # B-25



BARREL TEST

STARTING DATE: 8/27/79

SAMPLE # B-25



High grade from Excavator N.E. End
Cent. Cut

9-5-79
3:00 pm
11 grams NaCN
11 Liters H_2O
6 grams NaOH

BARREL TEST LEACH DATA

P-418

Note: 100# sample was mixed and cut and put into 2 50# samples for Barrel Test #B-26 and B-27

Tar. Wt. 6
Total

Sample Identification B-26 Wet Wt. 20.5 / 6 / 14.5 24.0 / 6 / 18.0 (16.0 / 6 / 10.0; 20.0 / 6 / 14.0 72 hr) $\%H_2O$ Dry Wt. 50

TIME	SAMPLE	PREG. ASSAYS		SAMPLE	OZS. LEACHED		TITRATIONS			REAGENTS ADDED		REAGENTS CONSUMED	
Hrs.	weight	Au	Ag	Ratio	Au	Ag	NaCN	NaOH	Ph	NaCN	NaOH	NaCN	NaOH
24	14.5	.052	3.20	.29	7.5 / 4.50 .015	9.20 .92	13.00 0.9		11			1.1	
48	18.0	.046	1.40	.36	5.10 .017	.87	13.50 0.5		10	6 grams	2 gr	1.5	
72	14.0	.060	3.36	.28	.017	.94	1.0		11			1.0	
96	10.0	.078	5.12	.20	4.80 .016	1.0	0.7		11			1.3	