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TERMINATION LIABILITY CURVE STUDY.(U)
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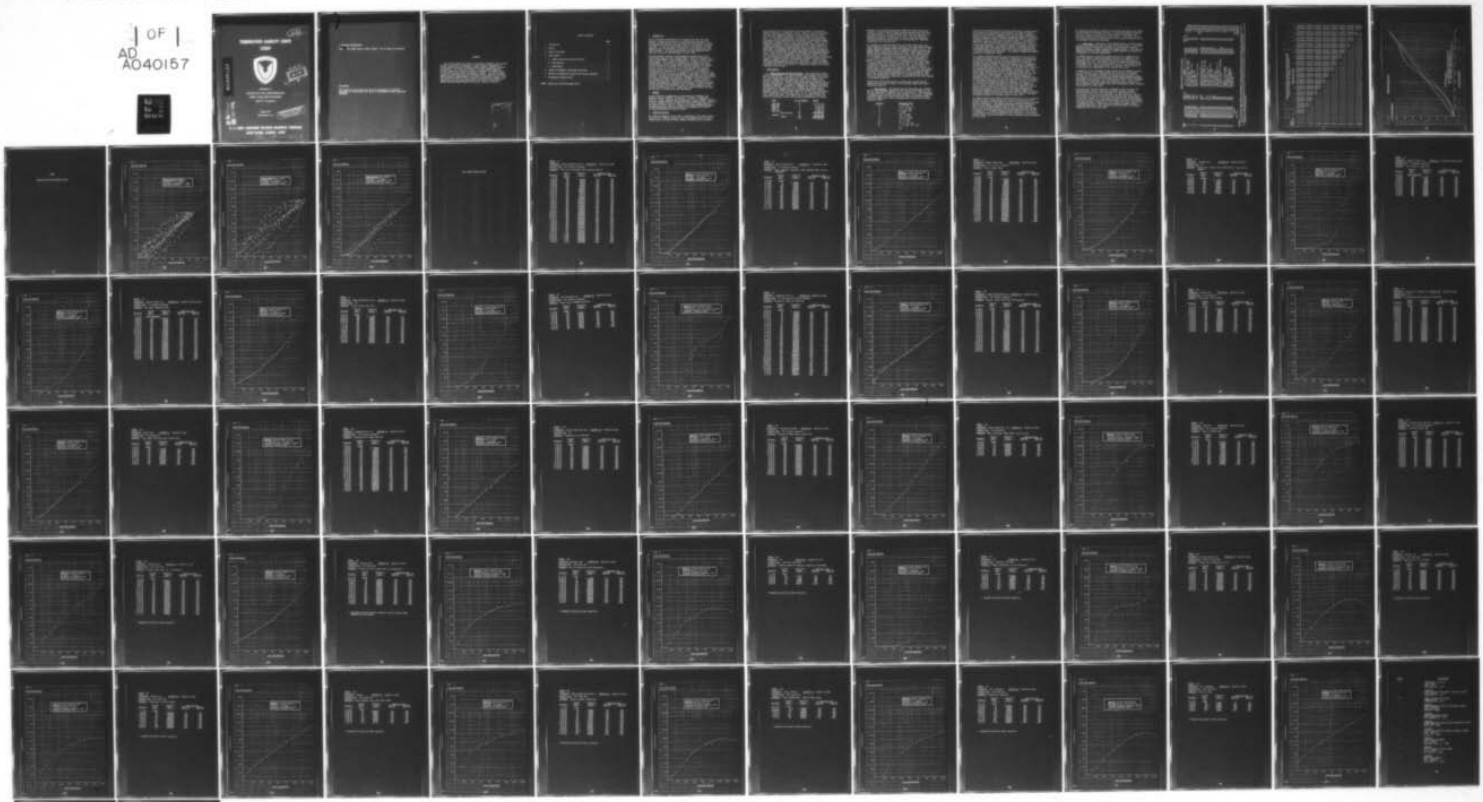

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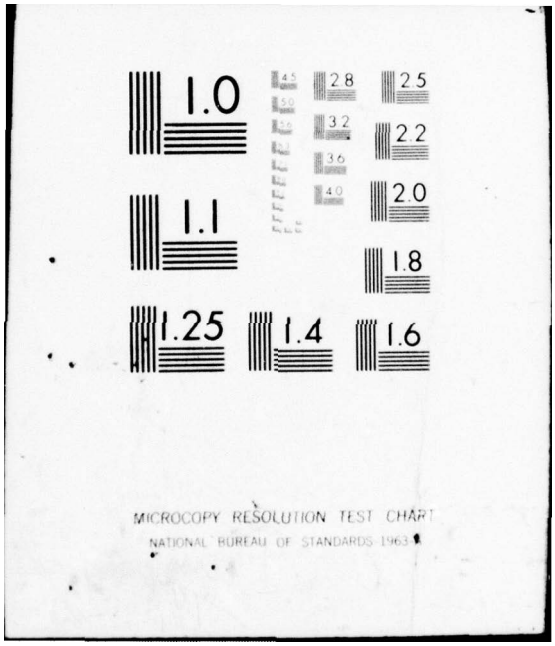
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TERMINATION LIABILITY CURVE STUDY

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OFFICE OF THE COMPTROLLER
COST ANALYSIS DIVISION
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ABSTRACT

This study provides the results of analyzing cumulative cost incurred patterns on contracts representing a cross-section of Headquarters, US Army Armament Materiel Readiness Command (ARRCOM) commodity-oriented procurements. The study was performed to develop ARRCOM commodity-oriented termination liability table(s) as requested by Headquarters, US Army Materiel Development and Readiness Command. The study provides comparative regression plots for armament products, ammunition products, ARRCOM combined armament/ammunition products, along with the plot of the DOD Termination Liability Table currently being applied by ARRCOM. The termination liability table developed in the study is based upon the ARRCOM combined armament/ammunition products regression analysis.

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1. INTRODUCTION

The US Government traditionally has recognized the need for prompt payments to supplying contractors, including making provisions for progress payments against costs incurred where the leadtimes or dollar investments involved could adversely affect the contractors' financial resources. It also has been US Army policy to pre-finance from Army appropriations the procurement of material for foreign military sales (FMS) customers. The Army appropriations are then reimbursed from centrally controlled customer deposit (trust) funds.

With the dramatic increase in FMS business in recent years, it is increasingly important that customer deposit funds are available for timely reimbursement to Army appropriations. Failure to provide timely reimbursements could seriously compromise the integrity of the basic Army programs. To minimize this possibility, procedures were established providing for customer deposit schedules whereby the customer would be advised of the amounts to be deposited quarterly to cover projected contractor costs incurred for the period. The quarterly customer deposit schedules are to be developed on the principle of "termination liability" which, in essence, is the costs incurred by the contractor during a given period incident to the goods or services being produced. Note that in this context, termination liability costs normally will not be synonymous with contractor billings for the period due to cash holdbacks or other unbilled costs incurred. Further (notwithstanding the semantics), termination liability costs normally will not include the nonrecurring follow-on costs incident to actual termination for convenience of the Government (costs of closing production lines, layaway, severence pay, etc.). These costs would be applied only when the decision to terminate has been implemented.

2. PURPOSE

Message, DRCCP-EV, Headquarters, US Army Materiel Development and Readiness Command (DARCOM), 151459Z Mar 77, subject: Termination Liability Curves, requested that Headquarters, US Army Armament Materiel Readiness Command (ARRCOM), develop and submit command-peculiar, commodity-oriented termination liability tables for review by higher authority. The purpose of this study was to develop the requested ARRCOM commodity-oriented termination liability table(s) for possible use in lieu of existing DOD termination liability tables.

3. SCOPE OF THE STUDY

The study was conducted on the basis of analyzing a final cross-section selection of 32 ARRCOM commodity-oriented procurements shown on page 6. Primary effort was made to select samples providing actual contractor

costs incurred over time consistent with the concepts of termination liability expressed in paragraph 1 above. However, seven of the samples are based upon fixed price delivery billings recognizing that some portion of the ARRCOM procurements for FMS customers will be on that basis. To the extent identifiable, significant one-time nonrecurring investments were excluded from the data analysis to preclude inordinate distortion of initial or final costs incurred patterns. (NOTE: Use of termination liability tables in computing customer payment schedules is primarily applicable to recurring production costs; with provision for significant nonrecurring production costs being a separate part of the computation. Accordingly, the termination liability table developed in this study was constructed to exclude significant nonrecurring production costs.) Each contract was analyzed to determine the progressive percentages of time and cost completions (Time = Variable X, Cost = Variable Y). These data were then processed through a regression analysis screening program (12 regression forms) to determine individual contract and/or composite commodity category "best-fit" regressions. A best-fit composite ammunition/armament regression was then used to compute the ARRCOM termination liability table (Percent of Termination Liability for Various Leadtimes) shown on page 7 .

4. STUDY RESULTS

a. Sample selection and data collection. The initial data collection was accomplished on 42 contracts/orders with aggregate total dollar value of $237,153,729. Screening of these samples resulted in deleting ten items (nonrepresentative conditions, duplicative samples, etc.) leaving 32 samples with aggregate total dollar value of $228,299,264 for the study analysis. Current ARRCOM procurement appropriation records indicate an approximate 3:1 ratio of ammunition to armament procurement obligation authority. Accordingly, 8 armament and 24 ammunition samples were included in the analysis. A FY 75 ammunition inflation study performed by this command indicated approximate ammunition component weighting factors of 12% for small arms (SA), 48% for metal parts (MPTS), 11% for propellants and explosives (P&E), 21% for load/assemble/pack (LAP), and 8% for other. The samples used in the final analysis were selected to provide a similar cross-section representation as follows:

Item	No. of Samples	Amount
Ammo-MPTS	10	$ 67,477,193
Ammo-P&E	3	43,147,410
Ammo-LAP	5	4,459,948
Ammo-SA	3	15,362,478
Ammo-other	3	5,500,071
Ammo-Subtotal	24	$135,947,100
Armament	8	92,352,164
TOTALS	32	$228,299,264

Nineteen of the selected samples were commercial vendor fixed price contracts. Twelve of these included progress payment reporting which provided contractor costs incurred data over time consistent with the termination liability concepts of this study. For the remaining 7 commercial contracts, the mid-month or end-of-month date immediately preceding delivery was used as the cost incurred date for computing elapsed days from contract award.

The remaining 13 selected samples were individual orders under the single operating (cost plus type) contract at the individual Government-owned, contractor-operated (GOCO) Army Ammunition Plants (AAP's). The monthly Summary of Orders and Cost of Deliveries reports provided the monthly costs incurred data used for analysis. These reports include identification of material inventories or other costs committed, but not yet applied, to an order as a potential cost incurred liability. It is a normal circumstance to find multiple orders concurrently in process for a single product at the mission AAP at any given time. Hence, the order sample selected is a representation of, rather than a complete analysis of, any given product item. In many cases, there were periods of apparent order (cost) inactivity for a variety of reasons (e.g., priority of other orders for the product, priority of other product lines, temporary production suspension, etc.) even though mission function production continued at the AAP. To preclude undue distortion of the elapsed days/cumulative cost relationship in these cases, the computation of elapsed days for extended periods of order inactivity was adjusted to equivalent elapsed days had the order remained in continuous production.

Elapsed days (from contract award or order start) and the related cumulative costs data are shown in the individual sample data sheets beginning on page 14.

b. Data Analysis. The elapsed days and cumulative costs incurred data for the individual samples were converted to percentages of time and cost completions (variables X and Y, respectively). The percentage of completion data was then processed through a two-variable, regression screening program to determine individual sample and composite sample "best-fit" regressions. The screening process included the following regression forms:

Form No.	Regression Form
1	$Y = A + BX$
2	$Y = A + B\ (\text{Ln}\ X)$
3	$\text{Ln}\ Y = A + BX$
4	$Y = 1/(A + BX)$
5	$Y = AX^B$
6	$\sqrt{Y} = A + BX$
7	$Y = A + B\sqrt{X}$
8	$\sqrt{Y} = A + B\sqrt{X}$
9	$Y^2 = A + BX$
10	$Y^2 = A + BX^2$
11	$Y = A + BX + CX^2$
12	$Y + A + BX + CX^2 + DX^3$

The best fit regression form with related coefficients of determination and variation are indicated on the individual and composite sample regression plots shown in subsequent pages of the study. Comparative plotting of the best fit regressions for composite ammunition products, composite armament products, composite ammunition/armament, and the DOD termination liability table plot are shown on page 8. The composite ammunition regression indicated a slightly accelerated cost incurred rate in the first 20-25% of the order life and then tended to level out as the order progressed. The composite armament regression indicated a relatively slow cost incurred rate initially, an accelerating rate from approximately 10 to 45% of order life, with only slight increase in the cost incurred rate thereafter. The composite ammunition/armament regression is essentially linear.

The slightly accelerated initial cost incurred rate in the early life of ammunition product orders represents a combination of two partially off-setting influences. On the one hand, regressions of the GOCO AAP contract data are influenced by the peculiarities of the GOCO AAP accounting practices whereby material procurements must be immediately charged to applicable orders. Frequently, the material procurements for several orders may be initially charged to one order (as a "carrier") for accounting convenience, and subsequently the material costs are redistributed from the carrier order to other applicable orders. The carrier order obviously will show an exaggerated initial material cost until charges are redistributed. Even after redistributions, the individual orders will continue to carry the material commitment cost although the material still may not have been applied to work-in-process. This procedure recognizes the potential liability involved if the order is cancelled and the material cannot be reapplied. By contrast, the costs incurred for ammunition metal parts procured from commercial contract sources tends to include only actual costs applied to work-in-process and excludes material inventory commitments which have not actually been applied. The net result of the combined ammunition regression (combined GOCO AAP and metal parts orders) tended to indicate the slightly prevailing influence of the GOCO AAP material commitment accounting procedures in the early phases of order life.

The samples used for the armament products regressions are all commercial contractors whose accounting practices tended to include only costs actually applied to work-in-process as costs incurred (excluding unissued material commitments). The samples represent established contractors who have had on-going production with the same or similar products. Hence, the cost incurred patterns tend to show an acceleration through the initial production build-up to sustaining production rates and then a leveling out. A somewhat different pattern might occur in the case of procuring a new or out-of-production item, or going to a new contract source; however, appropriate samples of these conditions were not available for this study.

No attempt has been made to normalize the raw cost data used in this study for the effects of inflation over time. No effective method was found on which to allocate the effects of inflation even in those cases where escalation clauses were contained in the contract. Accordingly, use of this study should be with due consideration that regression results may be in some degree affected by inflation.

c. Conclusions. Comparisons of the ARRCOM composite regression plots with the DOD termination liability table are shown on page 8. The ARRCOM commodity-peculiar termination liability table, based upon composite ammunition/armament products regression is shown on page 7. The table and comparative plots have been forwarded to higher authority for review and consideration for possible application.

The ARRCOM composite regressions (ammunition products, ammunition products, and combined ammunition/armament products) are regarded as valid representatives of costs incurred consistent with the connotation of termination liability. The principal difference between the ammunition and armament cost incurred patterns appears to occur in the first 40-45% of the order life; and in great part, is related to the peculiarity of including material commitments in the GOCO AAP order costs.

Irrespective of the differences between ammunition and armament concepts of costs incurred, it is observed that even in the case of progress payments, the Government's payments to the contractor during much of the contract life would not exceed the maximum standard progress payment percentages of costs incurred prescribed by the Armed Services Procurement Regulation (small business - 85%, large business - 80%). Hence, termination liability tables based upon cost incurred patterns would tend to have an inherent "reserve factor" built into the customer payment schedules during much of the order life.

As may be noted from the comparative termination liability plots, the DOD termination liability table and the ARRCOM composite armament products regression plots are essentially the same during the first 40% of time. As far as can be determined, the DOD termination liability table heretofore used has historically provided adequate reimbursement to the Army. However, it is not known how effective the DOD termination liability table has been in maintaining adequate reserves in the customer trust fund accounts. Similarly, it is not known what effect substituting a termination liability table based upon composite armament products regression might have on the customer trust fund accounts, particularly during the last 60% of order time.

SUMMARY OF COMMODITY ITEM SAMPLE SELECTIONS

Sample No	Contract Number	Contract Type 1/	Commodity Item	Commodity Category	Elapsed Days 2/	Value
1	DAAF03-70-C-0044	FP(PP)	M107, M110 Howitzers; M578 Rec. Veh.	Armament	1,169	$ 40,767,686
2	DAAF03-69-C-0042	FP(PP)	Guns, Auto. Aircraft, 7.62mm, GAU-2BA	Armament	608	3,926,288
3	DAAF03-68-C-0048	FP(PP)	Rifles, 5.56mm, M16A1	Armament	713	41,138,610
4	DAAA09-76-C-2003	FP	MG, 7.62mm, Fixed, M60E2 w/Equip	Armament	261	1,095,344
5	DAAF03-73-A-0150	FP(PP)	Gun, Auto., 20mm, M197	Armament	494	303,642
6	DAAF03-73-A-0150	FP(PP)	Gun, Auto., 20mm, M61A1	Armament	784	3,539,498
7	DAAA09-74-C-2029	FP	Tripod, MG, M122	Armament	942	1,104,364
8	DAAA09-76-C-6155	FP(PP)	Power Supply, Armament Subsystem	Armament	349	476,732
	SUBTOTAL					$ 92,352,164
9	DAAA09-72-C-0064	FP(PP)	Projectile, 175mm, HE, M437	Ammo-MPTS	447	$ 14,380,009
10	DAAA09-72-C-0360	FP(PP)	Booster, M125A1, MPTS Assy w/M17 Det.	Ammo-MPTS	549	4,459,171
11	DAAA09-73-C-0267	FP	Containers, Fiber f/105mm	Ammo-Other	487	3,408,416
12	DAAA09-73-C-4002	FP	M3 Bandoleers/Primer Percussion M28B2	Ammo-MPTS	380	2,781,800
13	DAAA09-75-C-0047	FP	Fuze, M550, PIBD	Ammo-MPTS	162	1,900,871
14	DAAA09-73-C-0201	FP(PP)	Projectile, HE, 155mm, M107	Ammo-MPTS	427	20,561,227
15	DAAA09-73-C-0048	FP	Projectile, 8", HE, M106	Ammo-MPTS	492	8,325,748
16	DAAA09-72-C-0190	FP(PP)	Projectile, 105mm, APDS-T, M392A1	Ammo-MPTS	732	7,081,257
17	DAAA09-75-C-0048	FP	Case, Cart., 105mm, M14B4	Ammo-MPTS	244	5,907,516
18	DAAA09-72-C-0047	FP(PP)	Fuze, PD, M524A6	Ammo-MPTS	518	1,248,339
19	DAAA09-73-C-0187	FP(PP)	Cartridge Igniter M285	Ammo-MPTS	775	831,255
20	DAAA09-71-C-0316	GOCO	5.56mm, Blank, M200, Ctn	Ammo-SA	579	5,994,830
21	DAAA09-71-C-0316	GOCO	7.62mm, Ball M80 & Tracer M62, 9/1	Ammo-SA	427	5,961,584
22	DAAA09-71-C-0316	GOCO	Cal.50 Tracer M17, Bulk	Ammo-SA	427	3,406,064
23	DAAA09-72-C-0170	GOCO	Add. Jacket, M1 f/Chg. Prop 175mm M86A2	Ammo-Other	152	294,531
24	DAAA09-72-C-0170	GOCO	Chg. Pron. M2 f/8"	Ammo-Other	245	1,797,124
25	DAAA09-73-C-0079	GOCO	Comp. B	Ammo-P&E	304	18,313,099
26	DAAA09-71-C-0329	GOCO	Propellant, M1 SB MP f/105mm	Ammo-P&E	334	5,798,438
27	DAAA09-71-C-0329	GOCO	Propellant, M1 SB MP f/155mm	Ammo-P&E	273	19,035,873
28	DAAA09-71-C-0265	GOCO	LAP 105mm M314A3	Ammo-LAP	213	521,154
29	DAAA09-72-C-0300	GOCO	Chg. & Booster f/XM70 Mine	Ammo-LAP	427	280,000
30	DAAA09-71-C-0288	GOCO	LAP, 60mm, HE, M49A4 w/Fuze	Ammo-LAP	183	1,644,339
31	DAAA09-71-C-0289	GOCO	Projectile, 155mm M483	Ammo-LAP	305	1,860,000
32	DAAA09-71-C-0289	GOCO	Fuze, BD, M534	Ammo-LAP	213	154,455
	SUBTOTAL					$135,947,100
	GRAND TOTAL					$228,299,264

Footnotes:

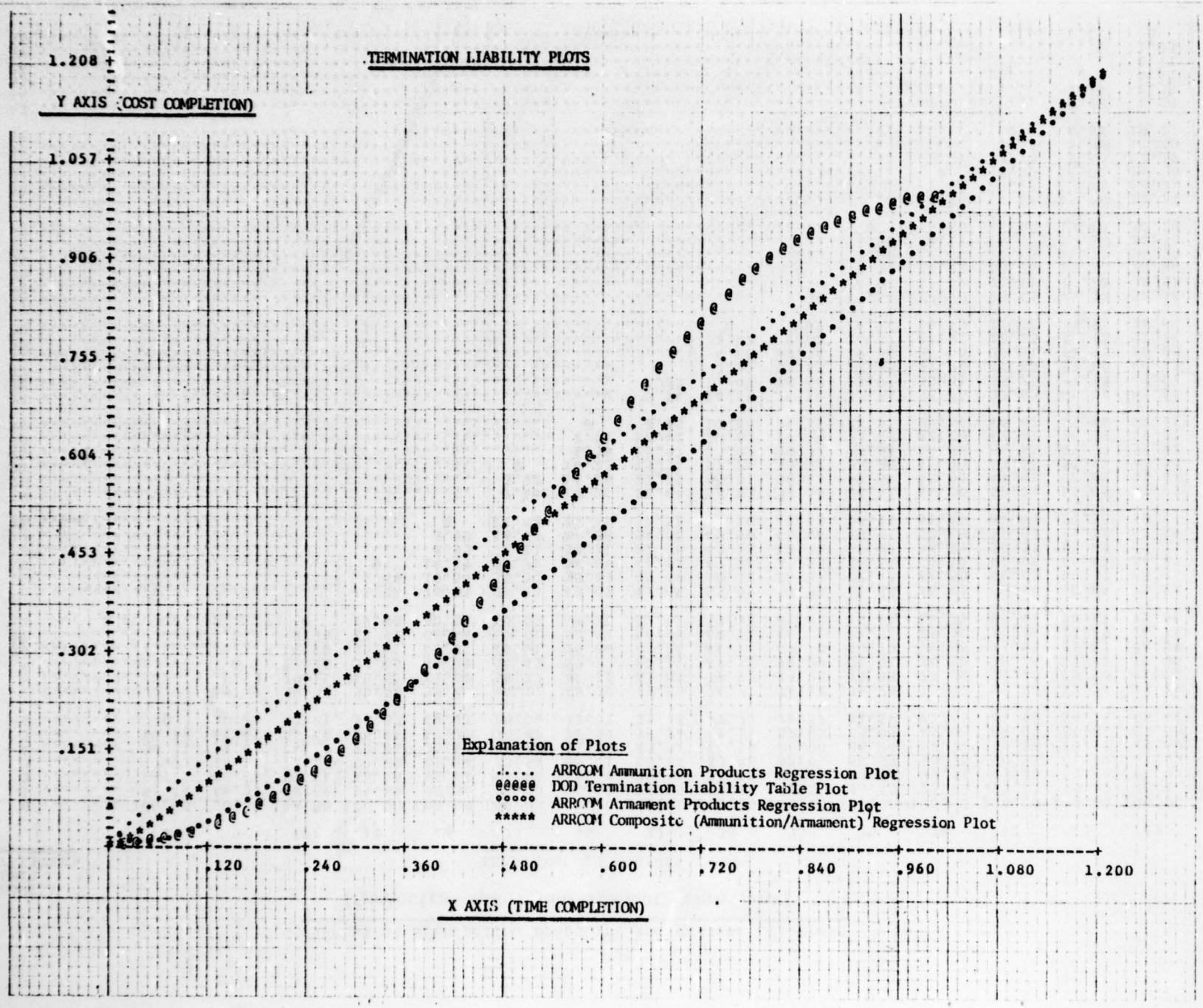
1/ FP = Fixed price contracts including firm fixed price, fixed price w/escalation or incentive provisions; (PP) = Includes progress payment contract provisions; GOCO = Cost plus type contracts at Government-owned, contractor-operated Army Ammunition Plants (AAP's)

2/ Elapsed days in GOCO contracts were adjusted to compensate for periods of order inactivity or for extended delays following final deliveries to effect final accounting adjustments.

PERCENT OF TERMINATION LIABILITY FOR VARIOUS LEADTIMES

(Composite Ammunition/Armament Regression)

MONTHS UNTIL DELIVERY	LEADTIMES IN MONTHS														
	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48
0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1	61.14	66.84	89.69	91.40	92.54	93.36	93.97	94.45	94.83	95.14	95.40	95.62	95.81	95.97	96.11
2	64.11	75.45	81.14	84.56	86.84	88.46	89.69	90.64	91.40	92.02	92.54	92.98	93.36	93.68	93.97
3	47.21	64.11	72.61	77.72	81.14	83.58	85.41	86.84	87.98	88.91	89.69	90.35	90.91	91.40	91.83
4	30.51	52.82	64.11	70.91	75.45	78.70	81.14	83.04	84.56	85.80	86.84	87.71	88.46	89.12	89.69
5	14.19	41.61	55.64	64.11	69.77	73.83	76.87	79.24	81.14	82.69	83.99	85.08	86.02	86.84	87.55
6	0	30.51	47.21	57.33	64.11	68.96	72.61	75.45	77.72	79.59	81.14	82.45	83.58	84.56	85.41
7		19.56	38.83	50.58	58.46	64.11	68.36	71.66	74.31	76.48	78.29	79.82	81.14	82.28	83.27
8		8.93	30.51	43.85	52.82	59.27	64.11	67.88	70.91	73.38	75.45	77.20	78.70	80.00	81.14
9		0	22.28	37.16	47.21	54.43	59.87	64.11	67.51	70.29	72.61	74.58	76.26	77.72	79.00
10			14.19	30.51	41.61	49.61	55.64	60.34	64.11	67.20	69.77	71.96	73.83	75.45	76.87
11			6.38	23.92	36.04	44.81	51.42	56.58	60.72	64.11	66.94	69.34	71.39	73.18	74.74
12			0	17.40	30.51	40.02	47.21	52.82	57.33	61.03	64.11	66.72	68.96	70.91	72.61
13				11.02	25.01	35.25	43.01	49.08	53.95	57.95	61.28	64.11	66.54	68.64	70.48
14				4.68	19.56	30.51	38.83	45.34	50.58	54.87	58.46	61.50	64.11	66.37	68.36
15				0	14.19	25.79	34.66	41.61	47.21	51.80	55.64	58.89	61.69	64.11	66.23
16					8.93	21.11	30.51	37.90	43.85	48.74	52.82	56.29	59.27	61.85	64.11
17					3.90	16.48	26.38	34.20	40.50	45.68	50.01	53.69	56.85	59.59	61.99
18					0	11.92	22.28	30.51	37.16	42.63	47.21	51.09	54.43	57.33	59.87
19						7.46	18.21	26.84	33.83	39.59	44.41	48.50	52.02	55.08	57.75
20						3.22	14.19	23.19	30.51	36.55	41.61	45.92	49.61	52.82	55.64
21						0	10.23	19.56	27.20	33.52	38.83	43.33	47.21	50.58	53.53
22							6.38	15.97	23.92	30.51	36.04	40.76	44.81	48.33	51.42
23							2.71	12.42	20.65	27.50	33.27	38.18	42.41	46.09	49.31
24							0	8.93	17.40	24.51	30.51	35.62	40.02	43.85	47.21
25								5.54	14.19	21.54	27.75	33.06	37.63	41.61	45.11
26								2.33	11.02	18.58	25.01	30.51	35.25	39.38	43.01
27								0	7.90	15.65	22.28	27.96	32.88	37.16	40.92
28									4.88	12.74	19.56	25.43	30.51	34.93	38.83
29									2.02	9.88	16.87	22.91	28.15	32.72	36.74
30									0	7.07	14.19	20.40	25.79	30.51	34.66
31										4.34	11.54	17.90	23.45	28.30	32.58
32										1.78	8.93	15.42	21.11	26.10	30.51
33										0	6.38	12.97	18.79	23.92	28.44
34											3.90	10.54	16.48	21.73	26.38
35											1.58	8.14	14.19	19.56	24.33
36											0	5.80	11.92	17.40	22.28
37												3.53	9.68	15.26	20.24
38												1.41	7.46	13.13	18.21
39												0	5.30	11.02	16.20
40													3.22	8.93	14.19
41													1.27	6.88	12.20
42													0	4.88	10.23
43														2.95	8.29
44														1.15	6.38
45														0	4.51
46															2.71
47															1.05
48															0


TERMINATION LIABILITY PLOTS
Y AXIS (COST COMPLETION)
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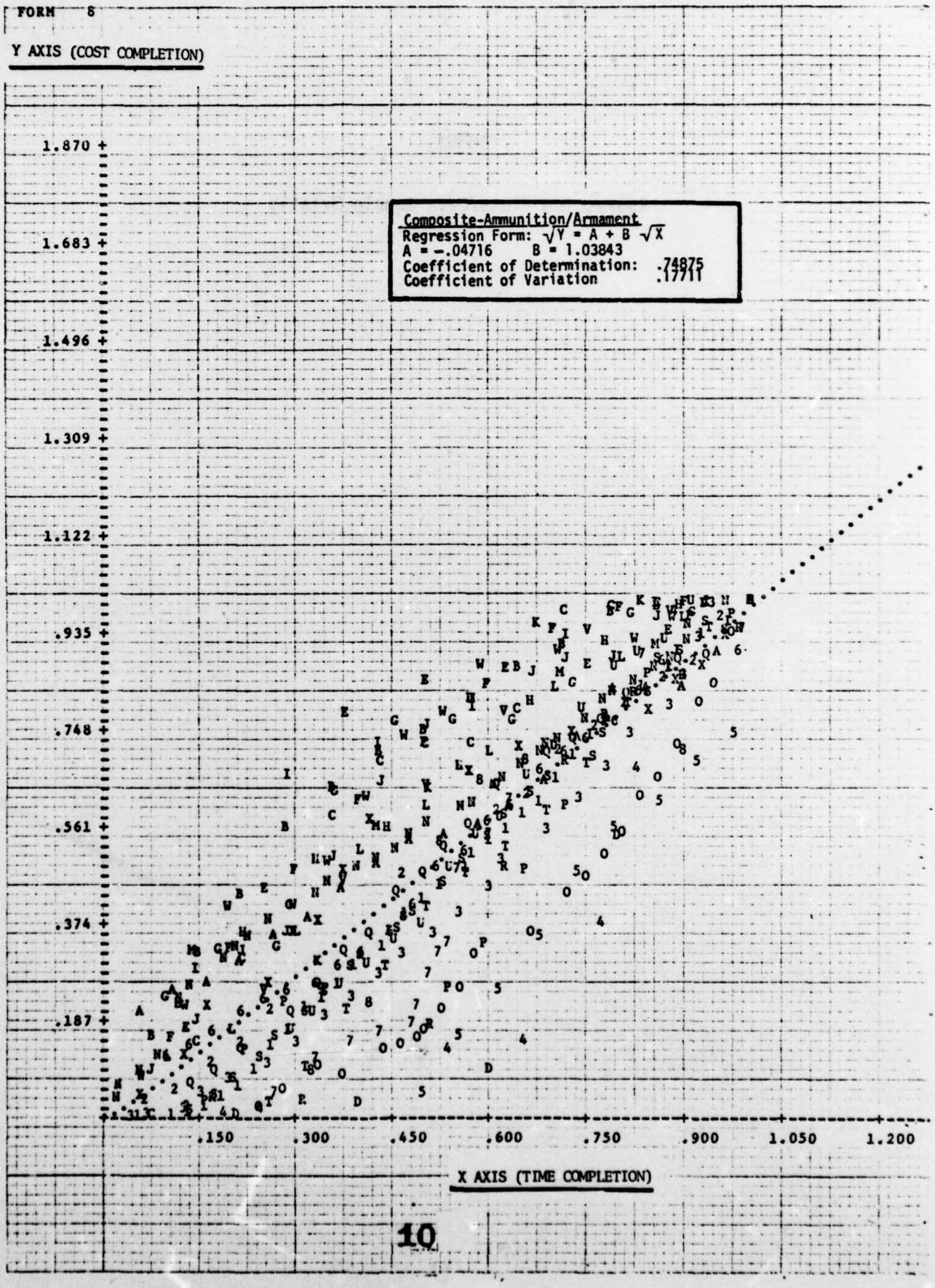
.151
.120
.240
.360
.480
.600
.720
.840
.960
1.080
1.200
X AXIS (TIME COMPLETION)
Explanation of Plots
..... ARRCOM Ammunition Products Regression Plot
@@@@@ DOD Termination Liability Table Plot
ooooo ARRCOM Armament Products Regression Plot
***** ARRCOM Composite (Ammunition/Armament) Regression Plot

ANNEX

Regression Plots/Data Sample Details

FORM 8



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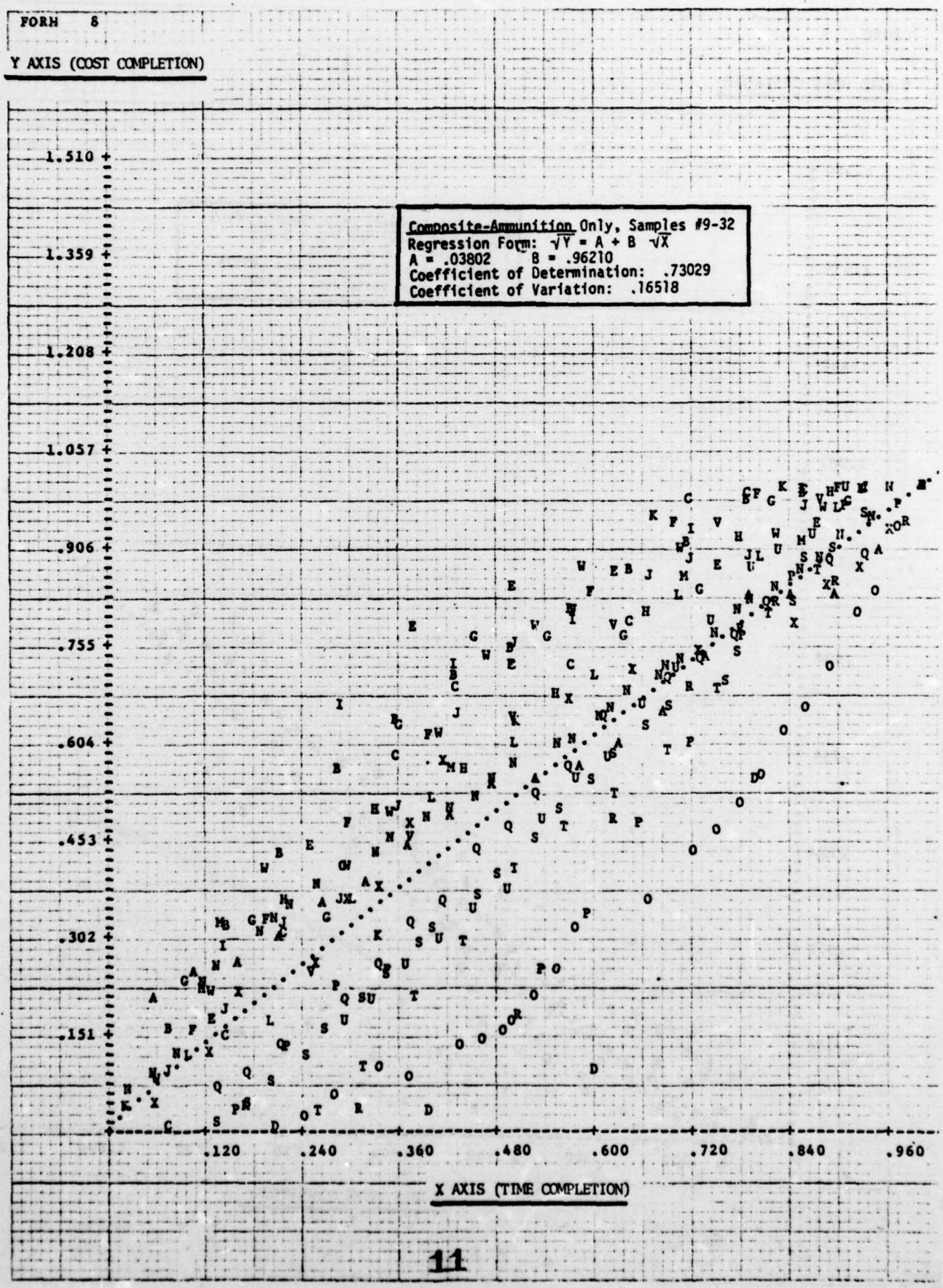
Y AXIS (COST COMPLETION)



Composite-Ammunition Only, Samples #9-32
Regression Form: $\sqrt{Y} = A + B\sqrt{X}$
A = .03802 B = .96210
Coefficient of Determination: .73029
Coefficient of Variation: .16518

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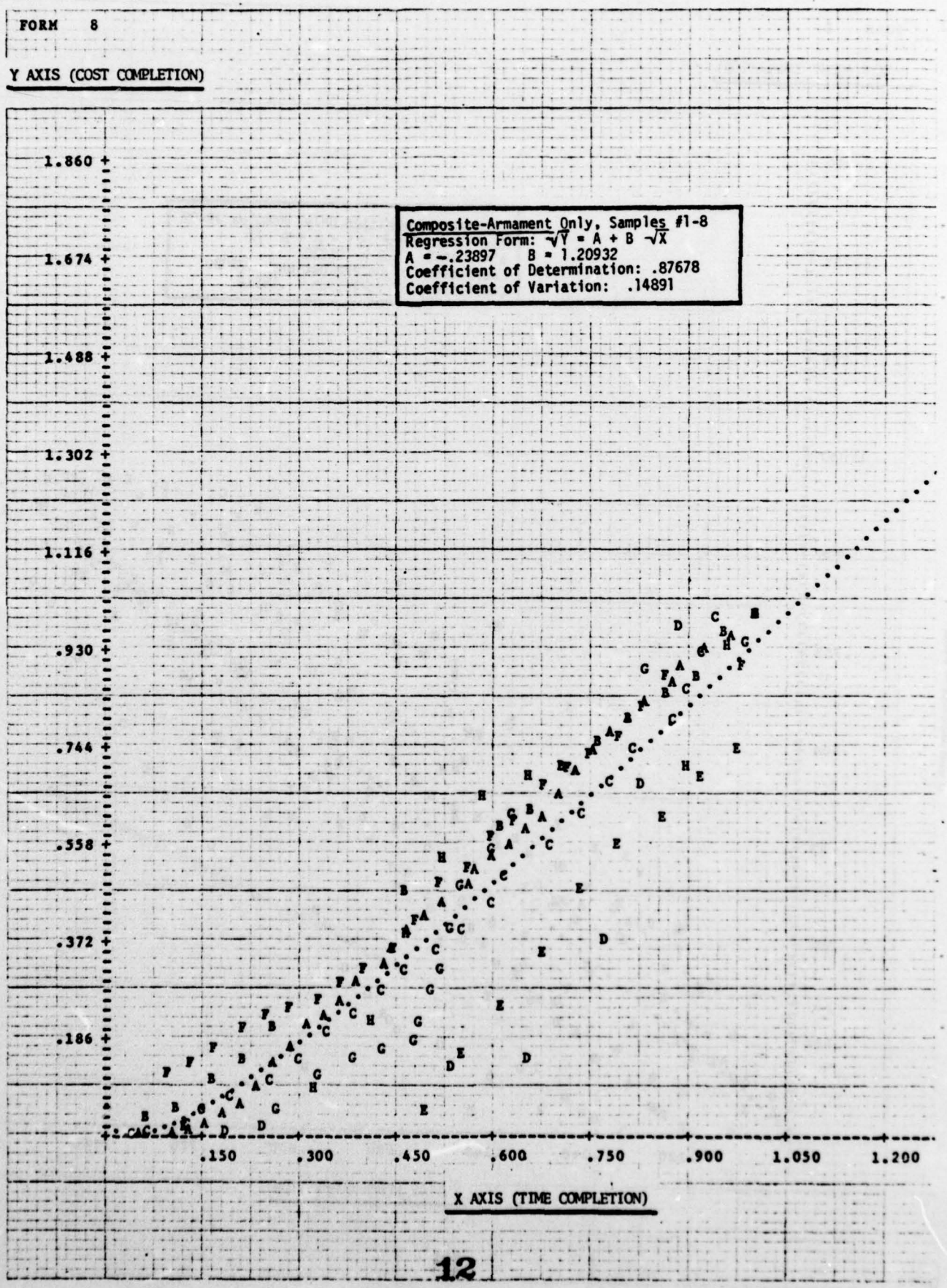
FORM 8

Y AXIS (COST COMPLETION)



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SAMPLE: #1

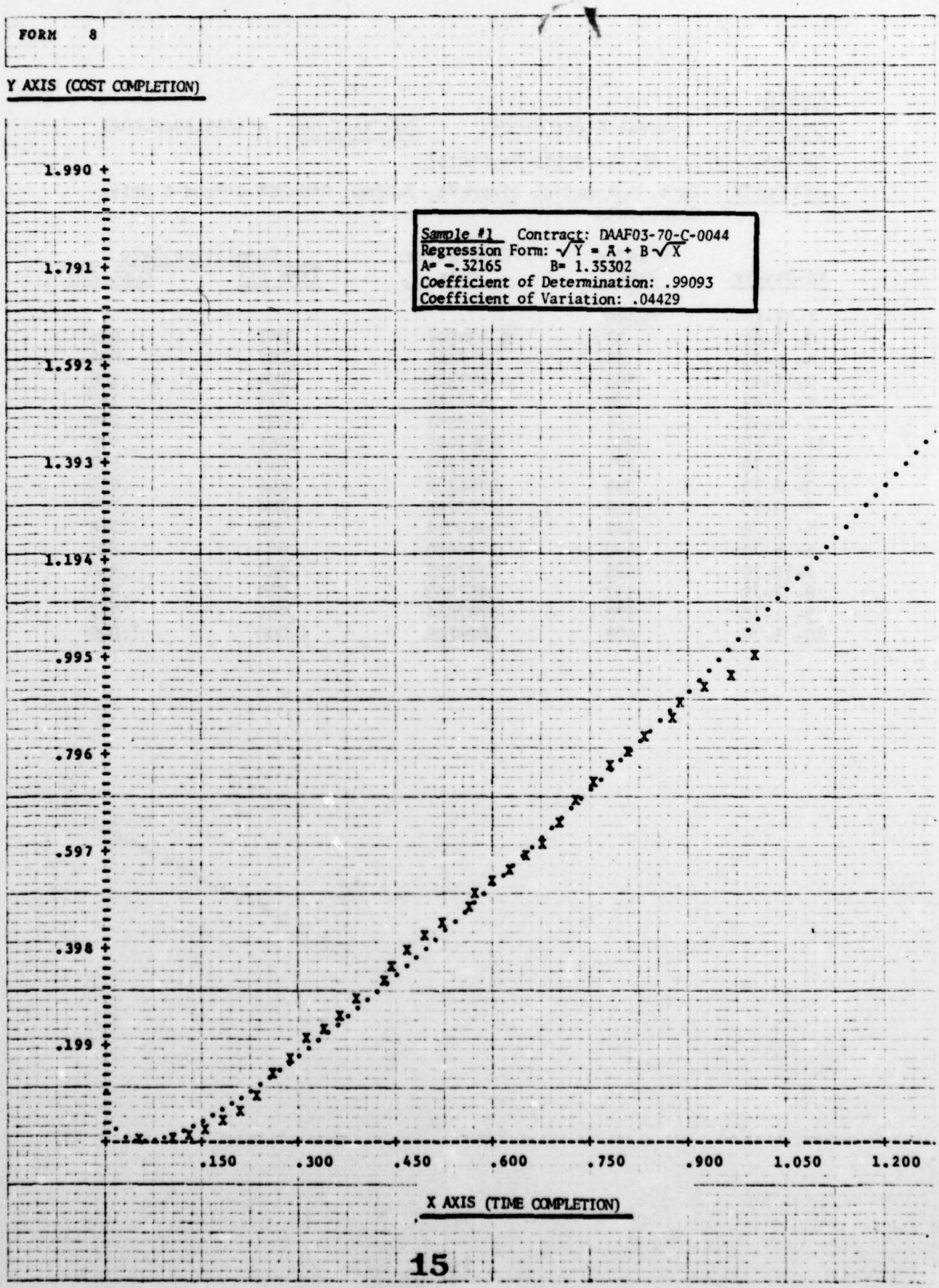
CONTRACTOR: Bowen-McLaughlin-York Co. CONTRACT NO: DAAF03-70-C-0044

CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: M107-M110 SP Howitzers; M578 Recovery Vehicles

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
1- 2-70	AWARD			
2-28-70	58	$ 182458	.050	.004
4-30-70	119	285556	.102	.007
5-31-70	150	502732	.128	.012
6-30-70	180	990459	.154	.024
7-31-70	211	1752375	.180	.043
8-31-70	242	2568235	.207	.063
9-30-70	272	3882492	.233	.095
10-31-70	303	5759704	.259	.141
11-30-70	333	7001791	.285	.172
12-31-70	364	8715450	.311	.214
1-31-71	395	9468206	.338	.232
2-28-71	423	10579131	.362	.259
3-31-71	454	12075895	.388	.296
5-20-71	504	13510318	.431	.331
5-31-71	515	14754951	.441	.362
6-30-71	545	16106900	.466	.395
7-31-71	576	17269505	.493	.424
8-31-71	607	18350812	.519	.450
10-20-71	657	19684062	.562	.483
10-31-71	668	20842499	.571	.511
11-30-71	698	21901810	.597	.537
12-31-71	729	22807040	.624	.559
1-31-72	760	23967258	.650	.588
2-29-72	789	24898160	.675	.611
3-31-72	820	26750801	.701	.656
4-30-72	850	28574976	.727	.701
5-31-72	881	30145549	.754	.739
6-30-72	911	31551171	.779	.774
7-31-72	942	32653662	.806	.801
8-31-72	973	33954351	.832	.833
10-17-72	1,020	35474705	.873	.870
10-31-72	1,034	36774290	.885	.902
12-15-72	1,079	38074055	.923	.934
1-31-73	1,126	39094305	.963	.959
3-15-73	1,169	40767686	1.000	1.000

FORM 8



WANG LABORATORIES, INC. 615-0204

SAMPLE: #2

CONTRACTOR: General Electric Co. CONTRACT NO: DAAF03-69-C-0042

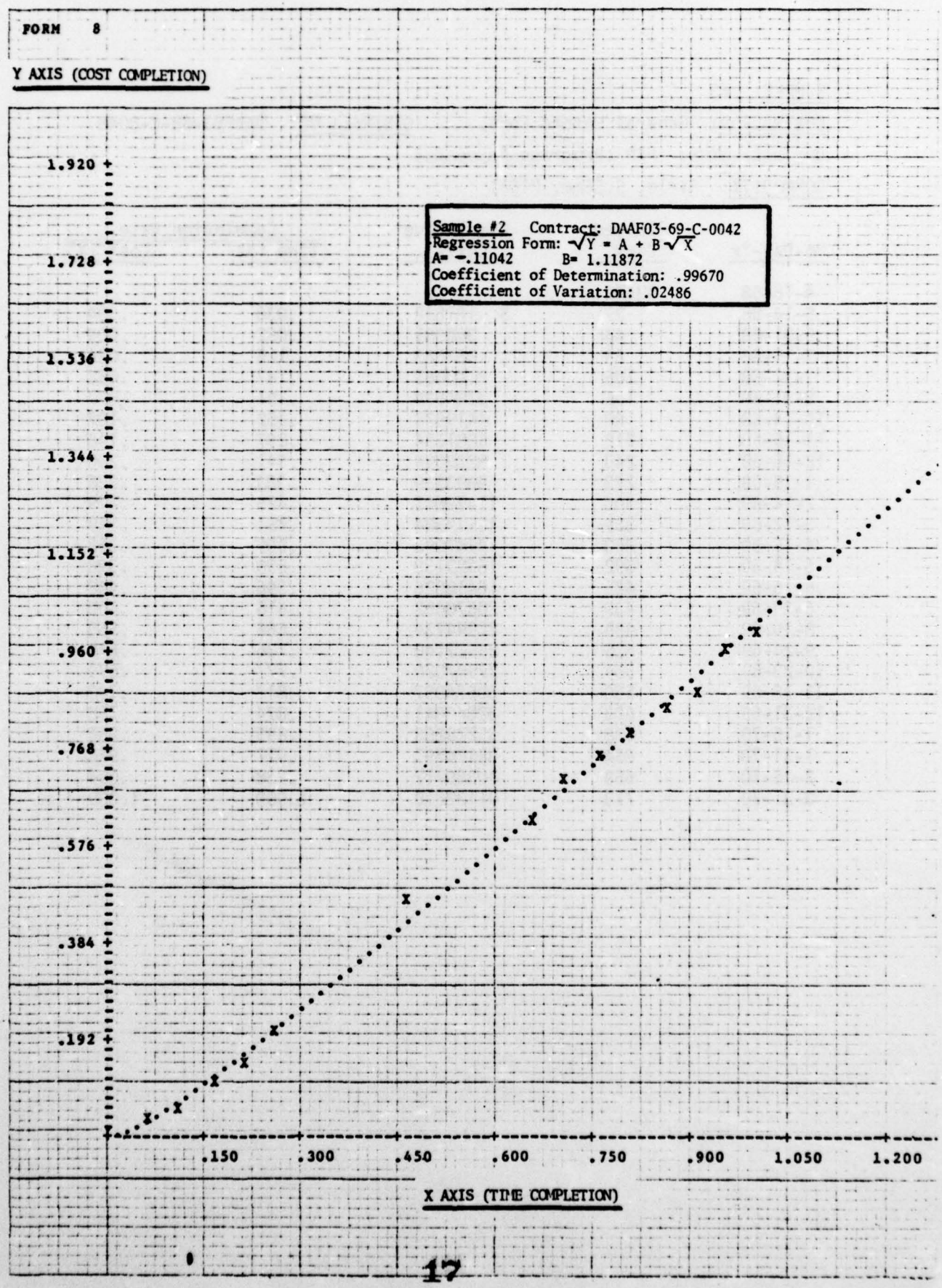
CONTRACT TYPE: FP (Progress Payments)

COMMODITY: Guns, Automatic, Aircraft, 7.62mm, GAU-2BA w/Feed & Drive Components

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
1-31-69	AWARD			
3- 9-69	37	$ 139897	.061	.036
4- 6-69	65	217456	.107	.055
5-11-69	100	423330	.164	.108
6- 8-69	128	578354	.211	.147
7- 6-69	156	822891	.257	.210
11- 7-69	280	1851952	.461	.472
2- 6-70	371	2331723	.610	.594
3- 6-70	399	2456209	.656	.626
4- 3-70	428	2782796	.704	.709
5- 8-70	462	2968054	.760	.756
6- 5-70	490	3145070	.806	.801
7-10-70	525	3337023	.863	.850
8- 7-70	553	3457963	.910	.881
9- 1-70	578	3797854	.951	.967
10- 1-70	608	3926288	1.000	1.000

FORM 8

Y AXIS (COST COMPLETION)



Sample #2 Contract: DAAF03-69-C-0042
Regression Form: $\sqrt{Y} = A + B\sqrt{X}$
A= -.11042 B= 1.11872
Coefficient of Determination: .99670
Coefficient of Variation: .02486

WANG LABORATORIES, INC. 615 0204

SAMPLE: #3

CONTRACTOR: General Motors Corp. CONTRACT NO: DAAF03-68-C-0048

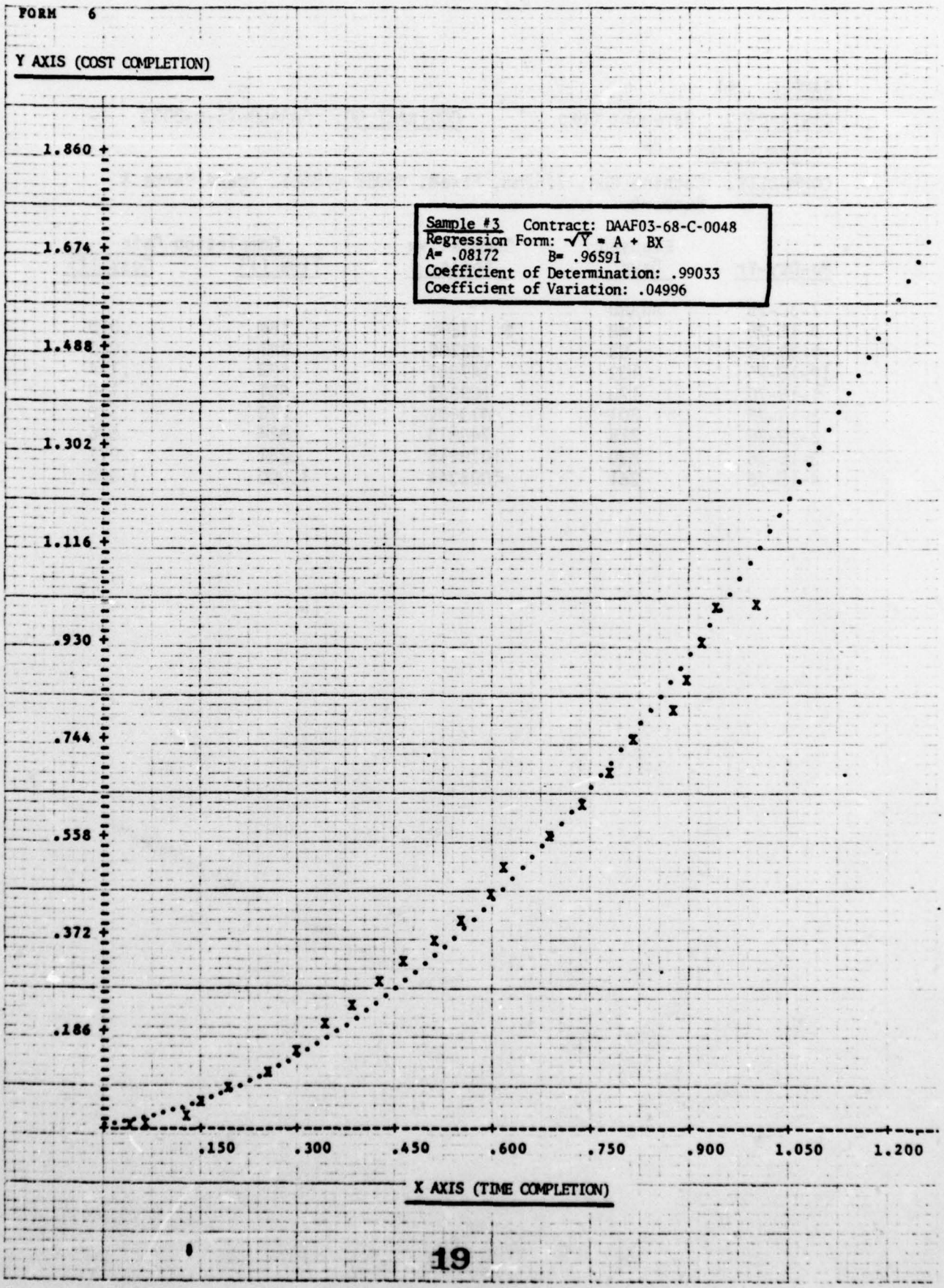
CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Rifle, 5.56mm, M16A1

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
4-18-68	AWARD			
5-14-68	27	$ 181832	.038	.004
5-31-68	44	366381	.062	.009
7-15-68	89	967683	.125	.024
7-31-68	105	2140061	.147	.052
8-31-68	136	3184539	.191	.077
10-14-68	180	4419078	.252	.107
11-15-68	212	6081394	.297	.148
12-16-68	243	8233099	.341	.200
1-15-69	273	9693339	.383	.236
2-14-69	303	11479641	.425	.279
3-12-69	329	13112384	.461	.319
4-15-69	363	14747092	.509	.358
5-14-69	392	16383138	.550	.398
6-16-69	425	18418026	.596	.448
6-30-69	439	20570662	.616	.500
8-19-69	489	22944734	.686	.558
9-24-69	525	25427148	.736	.618
10-23-69	554	27947020	.777	.679
11-18-69	580	30574057	.813	.743
12-31-69	623	32840841	.874	.798
1-15-70	638	35220263	.895	.856
1-31-70	654	38174791	.917	.928
2-15-70	669	40880717	.938	.994
3-31-70	713	41138610	1.000	1.000

FORM 6

Y AXIS (COST COMPLETION)



WANG LABORATORIES, INC. 615 0204

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SAMPLE: #4

CONTRACTOR: Maremont Corp CONTRACT NO: DAAA09-76-C-2003

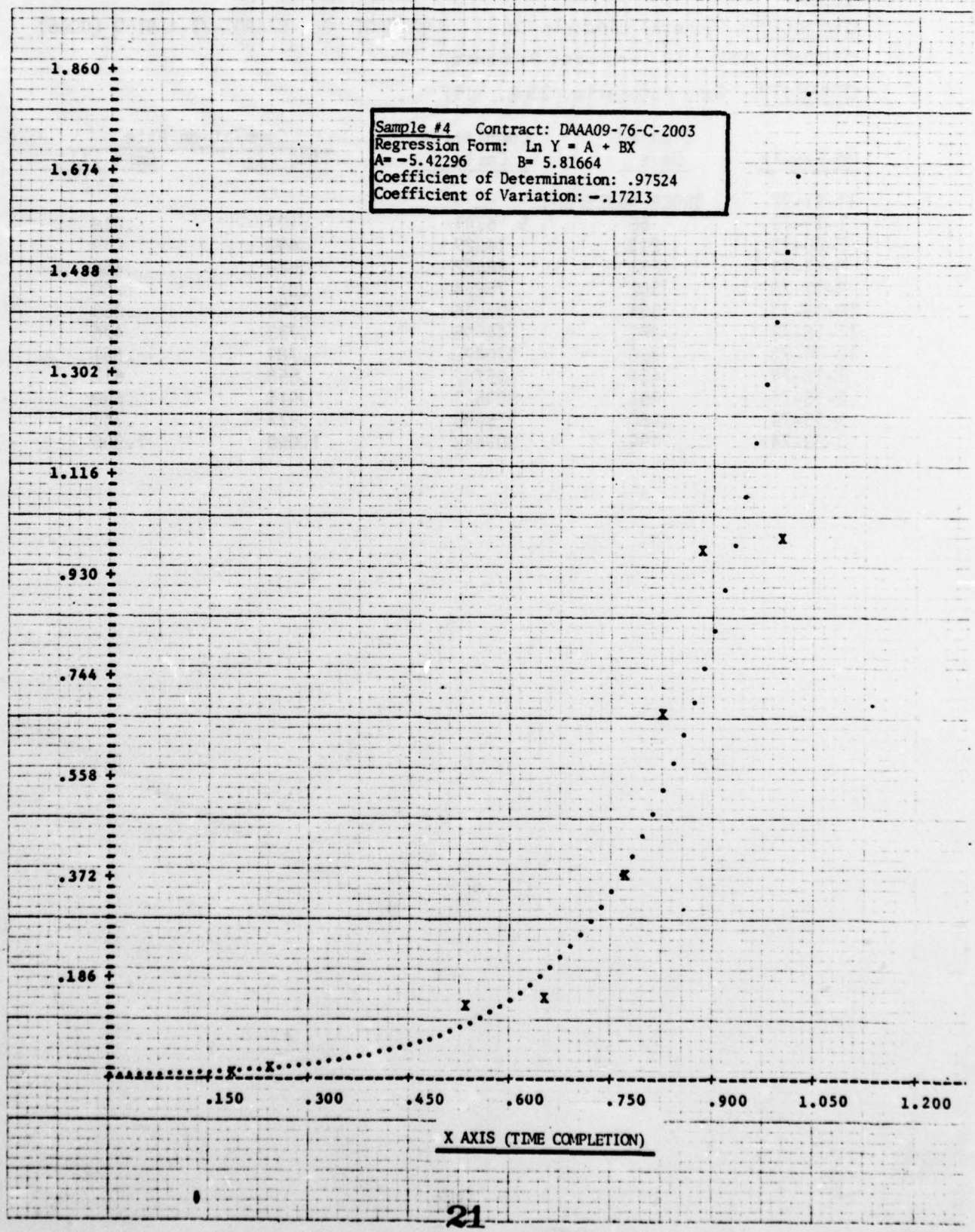
CONTRACT TYPE: FP

COMMODITY: Machine Gun, 7.62mm, Fixed, M60E2 w/BILI, Spare Parts & Support

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
7-30-75	AWARD			
9-15-75	48	$ 11200	.184	.010
9-30-75	63	22200	.241	.020
12-15-75	139	147087	.533	.134
1-15-76	170	163835	.651	.150
2-15-76	201	413609	.770	.378
2-29-76	215	740813	.824	.676
3-15-76	230	1070515	.881	.977
4-15-76	261	1095344	1.000	1.000

FORM 3

Y AXIS (COST COMPLETION)



WANG LABORATORIES, INC. 615 0204

WANG LABORATORIES, INC. 615 0204

SAMPLE: #5

CONTRACTOR: General Electric Co. CONTRACT NO: DAAF03-73-A-0150 (0006)

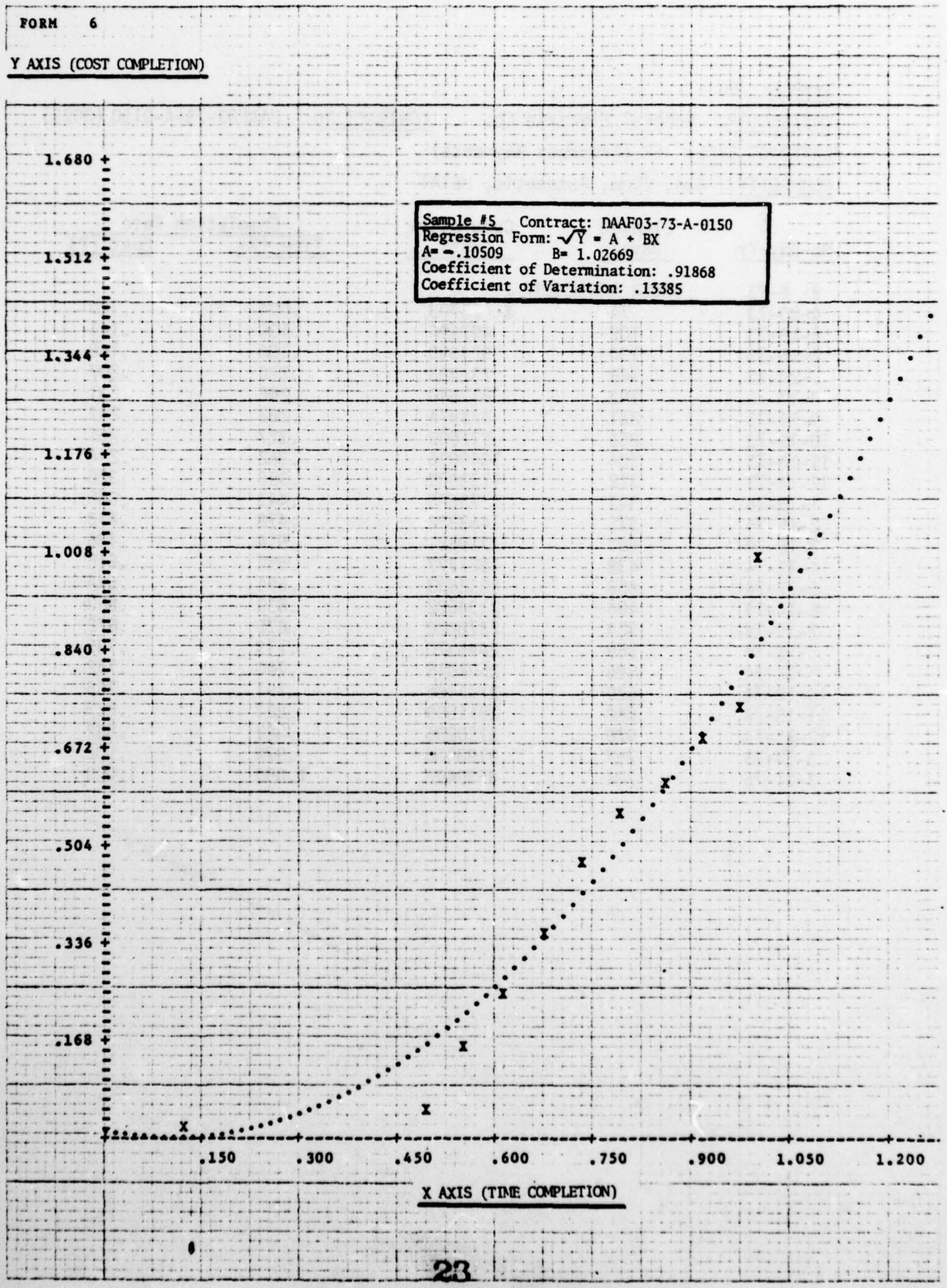
CONTRACT TYPE: FP (Progress Payments)

COMMODITY: Gun, Automatic, 20mm, M197

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
11-21-72	ORDER AGREEMENT			
1-19-73	60	$ 5741	.121	.019
7-20-73	243	14827	.492	.049
8-17-73	271	48322	.549	.159
9-17-73	302	75854	.611	.250
10-19-73	334	107046	.676	.353
11-16-73	362	144565	.733	.476
12-14-73	390	170470	.789	.561
1-18-74	424	185747	.858	.612
2-15-74	452	209523	.915	.690
3-15-74	480	225686	.972	.743
3-29-74	494	303642	1.000	1.000

FORM 6

Y AXIS (COST COMPLETION)



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SAMPLE: #6

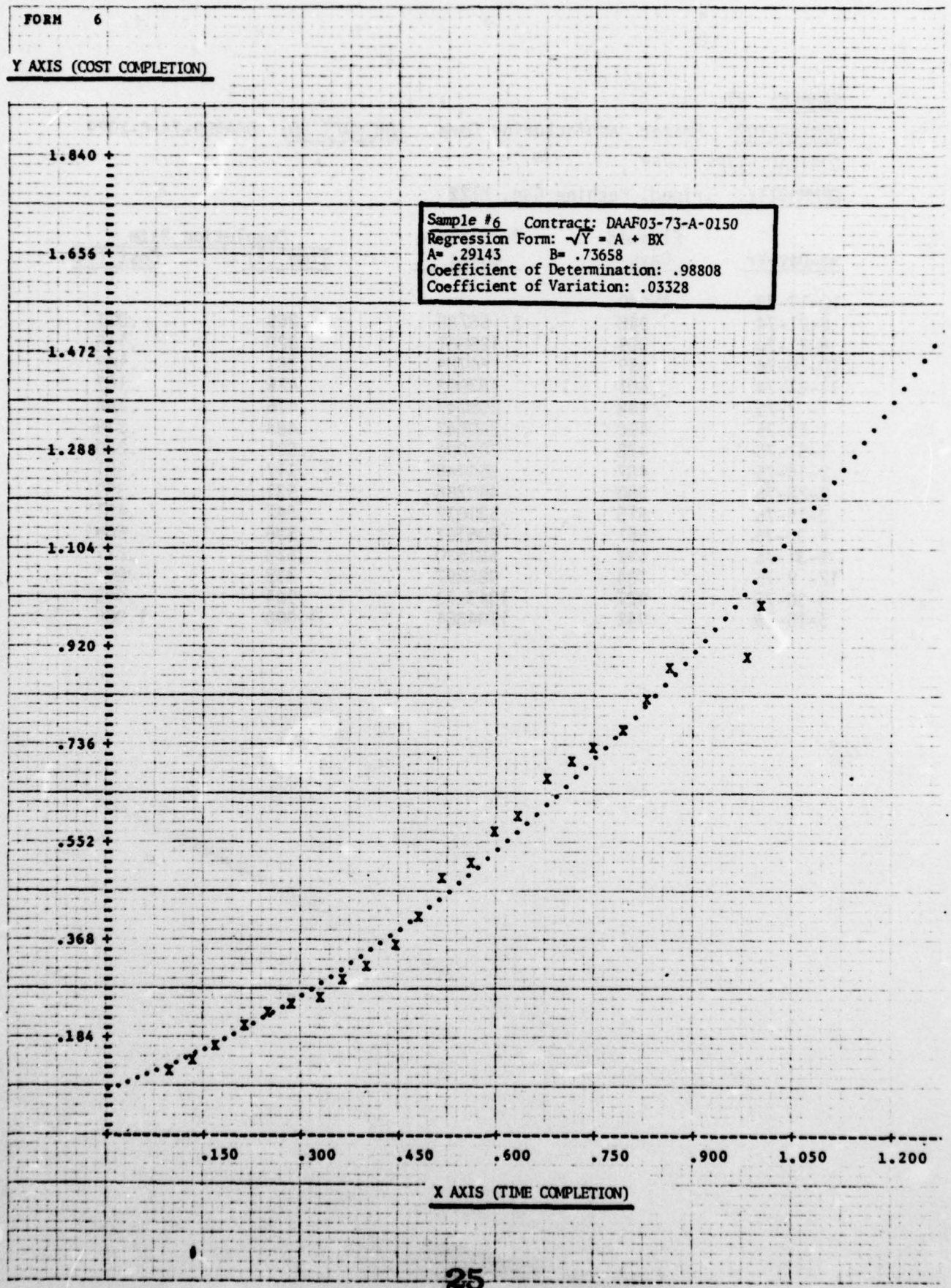
CONTRACTOR: General Electric Co. CONTRACT NO: DAAF03-73-A-0150 (0023)

CONTRACT TYPE: FP (Progress Payments)

COMMODITY: Gun, 20mm, Automatic, M61A1

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
2- 6-73	ORDER AGREEMENT			
4-20-73	74	$ 425703	.094	.120
5-18-73	102	497596	.130	.141
6-15-73	130	594390	.166	.168
7-20-73	165	731483	.210	.207
8-17-73	193	817640	.246	.231
9-14-73	221	873974	.282	.247
10-19-73	256	922603	.327	.261
11-16-73	284	1040096	.362	.294
12-14-73	312	1133909	.398	.320
1-18-74	347	1273686	.443	.360
2-15-74	375	1463332	.478	.413
3-15-74	403	1719621	.514	.486
4-19-74	438	1821777	.559	.515
5-17-74	466	2032893	.594	.574
6-14-74	494	2134582	.630	.603
7-19-74	529	2378870	.675	.672
8-16-74	559	2495370	.713	.705
9-13-74	585	2591015	.746	.732
10-18-74	620	2707486	.791	.765
11-15-74	648	2911599	.827	.823
12-13-74	676	3120235	.862	.882
3-14-75	767	3193136	.978	.902
3-31-75	784	3539498	1.000	1.000

FORM 6



WANG LABORATORIES, INC 615-0204

SAMPLE: #7

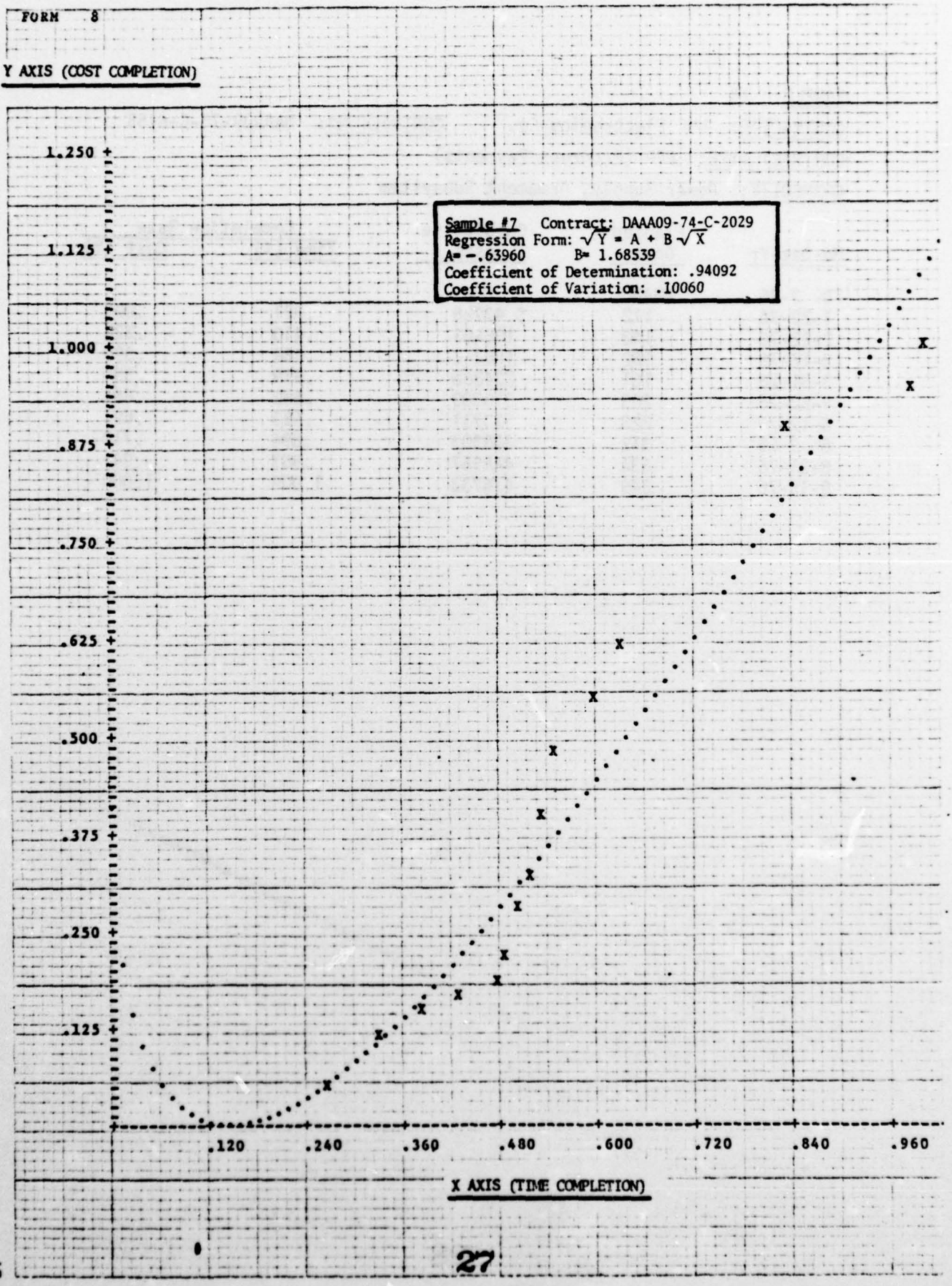
CONTRACTOR: Frazer Manufacturing Corp. CONTRACT NO: DAAA09-74-C-2029

CONTRACT TYPE: FFP

COMMODITY: Tripod, Machine Gun, M122

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
10-17-73	AWARD			
6-21-74	248	$ 56785	.263	.051
8-21-74	309	128001	.328	.116
10-10-74	359	164729	.381	.149
11-21-74	401	183992	.426	.167
1- 7-75	448	203747	.476	.184
1-15-75	456	240843	.484	.218
1-31-75	472	309006	.501	.280
2-15-75	487	354448	.517	.321
2-28-75	500	440788	.531	.399
3-15-75	515	531672	.547	.481
4-30-75	561	606197	.596	.549
5-31-75	592	681630	.628	.617
12- 9-75	784	986897	.832	.894
4-30-76	927	1043973	.984	.945
5-15-76	942	1104364	1.000	1.000

FORM 8



WANG LABORATORIES, INC. 815 0204

SAMPLE: #8

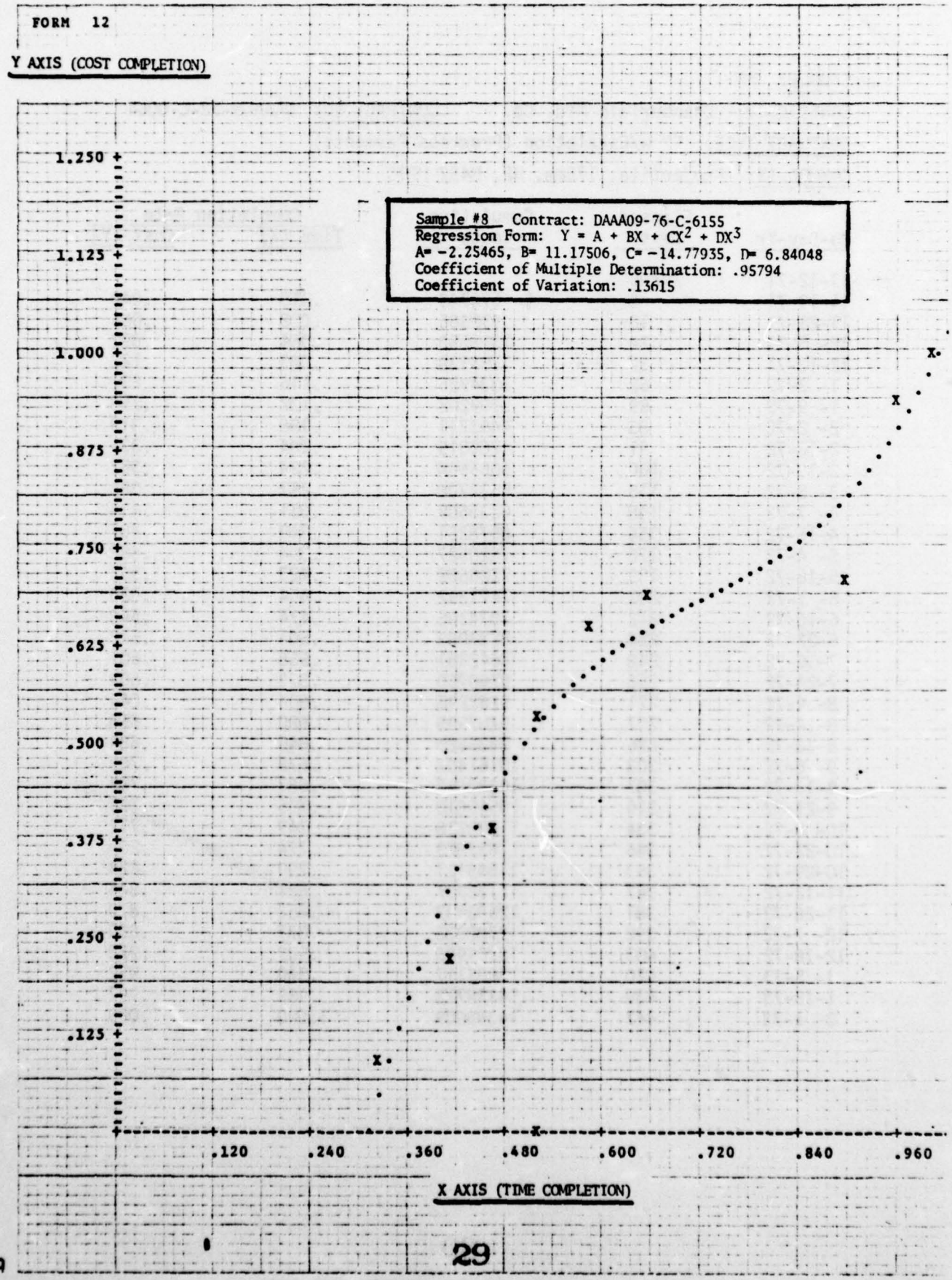
CONTRACTOR: UMC Electronics Co. CONTRACT NO: DAAA09-76-C-6155

CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Power Supply, Armament Subsystem

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
10- 3-75	AWARD			
1-22-76	112	$ 43726	.321	.092
2-22-76	143	106103	.410	.223
3-12-76	162	185747	.464	.390
3-31-76	181	254338	.519	.534
4-22-76	203	310503	.582	.651
5-17-76	228	329731	.653	.691
8- 9-76	312	338303	.894	.710
8-31-76	334	448557	.957	.941
9-15-76	349	476732	1.000	1.000

FORM 12



WANG LABORATORIES, INC. 833-0404

SAMPLE: #9

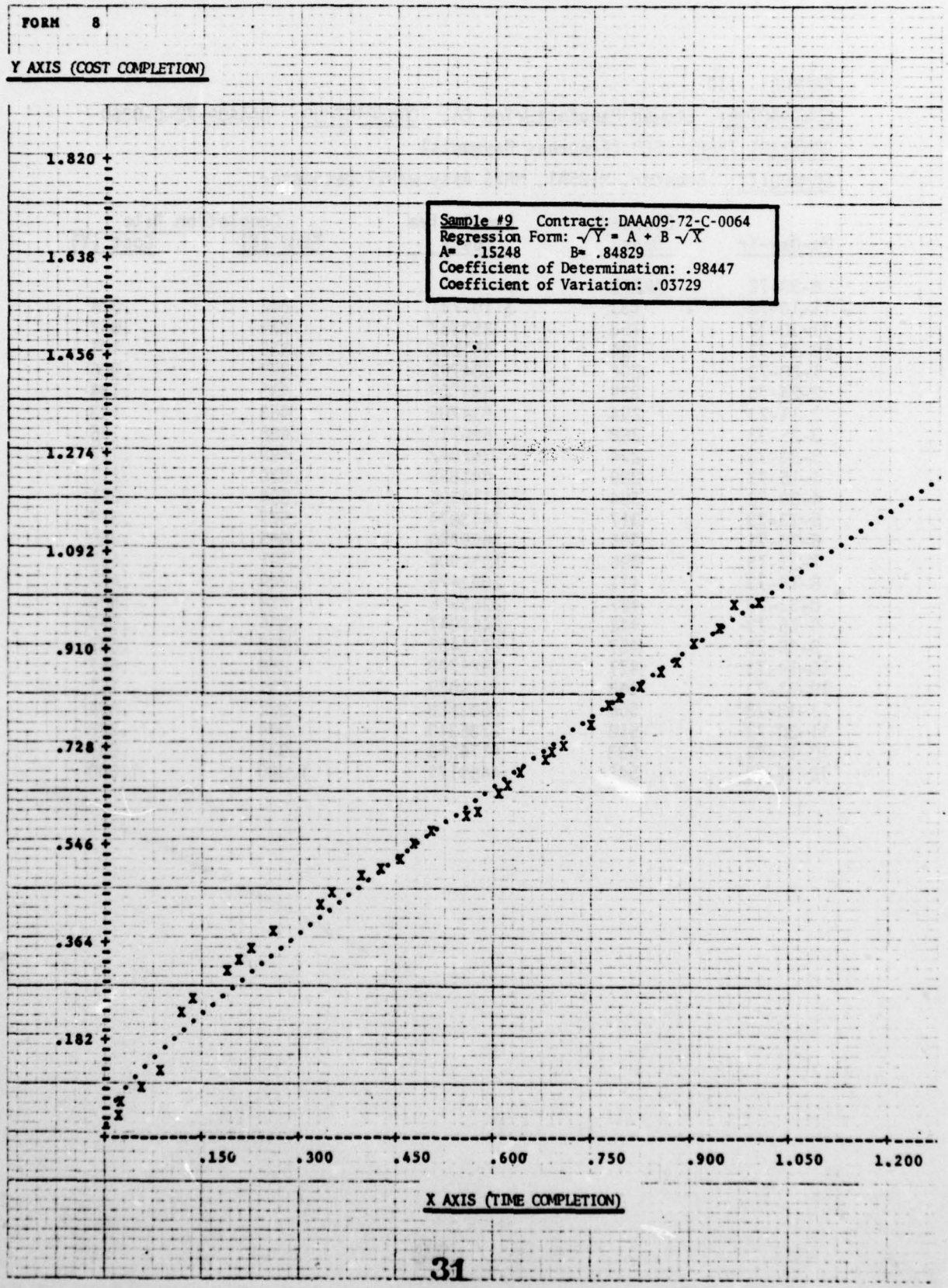
CONTRACTOR: Chamberlain Mfg. Co. CONTRACT NO: DAAA09-72-C-0064

CONTRACT TYPE: FP w/Escalation (Progress Payments)

COMMODITY: Projectile, 175mm, HE, M437 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
11-12-71	AWARD			
11-19-71	8	$ 576749	.018	.040
11-21-71	10	938365	.022	.065
12- 5-71	24	1328853	.054	.092
12-18-71	37	1754139	.083	.122
1- 2-72	52	3334926	.116	.232
1- 9-72	59	3709202	.132	.258
2- 2-72	83	4463711	.186	.310
2-10-72	91	4762019	.204	.331
2-19-72	100	5065504	.224	.352
3- 5-72	115	5532708	.257	.385
4- 7-72	148	6235609	.331	.434
4-15-72	156	6578251	.349	.457
5- 4-72	176	7020627	.394	.488
5-18-72	189	7220682	.423	.502
6- 1-72	203	7471392	.454	.520
6-10-72	212	7874305	.474	.548
6-22-72	224	8223063	.501	.572
7-16-72	248	8642381	.555	.601
7-24-72	256	8760760	.573	.609
8- 4-72	271	9262295	.606	.644
8-14-72	277	9457995	.620	.658
8-23-72	286	9835525	.640	.684
9- 6-72	303	10161403	.678	.707
9-13-72	307	10380442	.687	.722
9-21-72	315	10545810	.705	.733
10- 8-72	334	11095818	.747	.772
10-22-72	346	11637873	.774	.809
10-29-72	353	11843121	.790	.824
11-12-72	367	12132907	.821	.844
11-26-72	381	12503992	.852	.870
12- 7-72	392	12782333	.877	.889
12-18-72	403	13269995	.902	.923
1- 5-73	420	13687117	.940	.952
1-15-73	430	14338713	.962	.997
2- 1-73	447	14380009	1.000	1.000

FORM 8



WANG LABORATORIES INC 615 0204

SAMPLE: #10

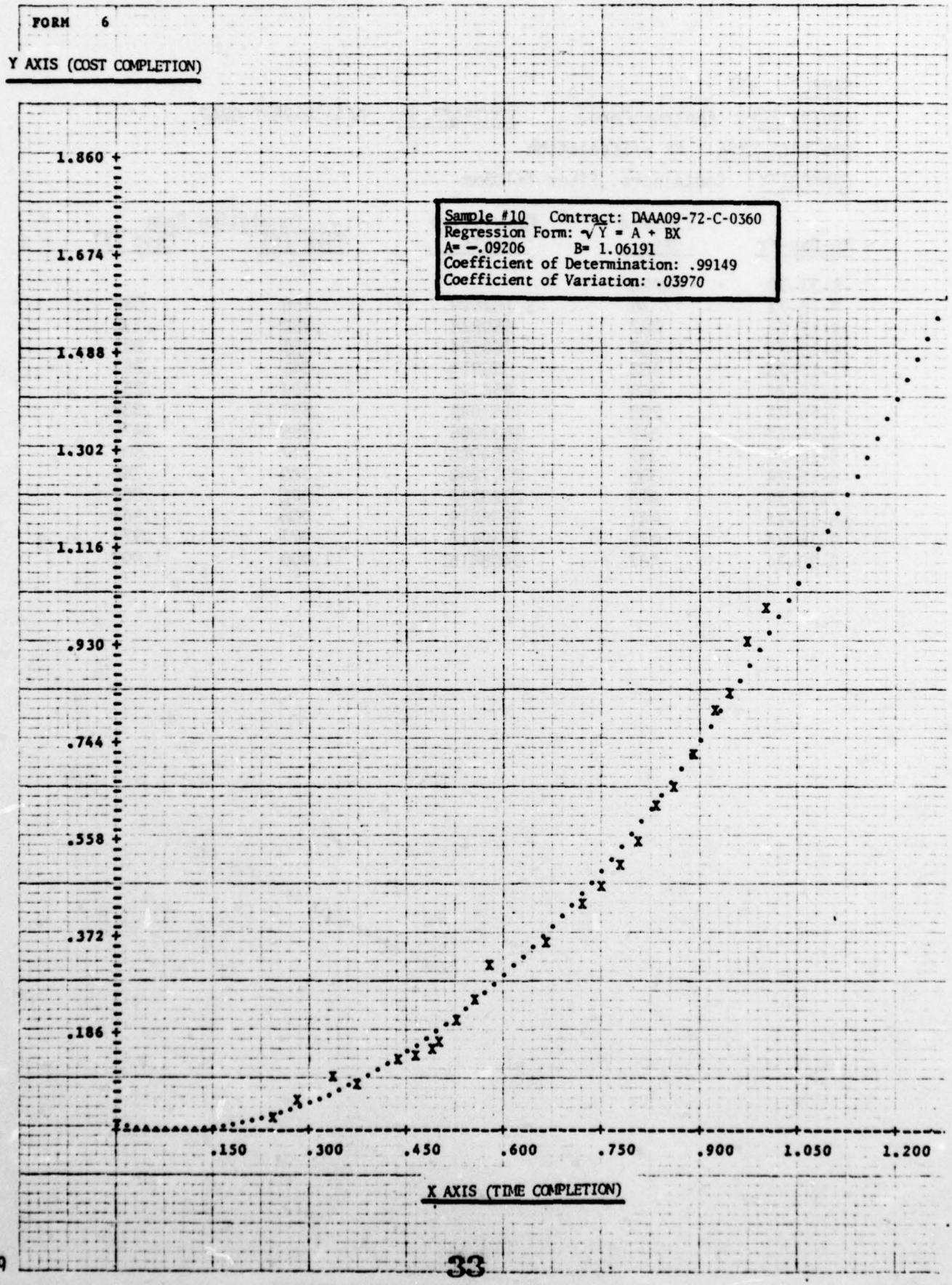
CONTRACTOR: Etowah Manufacturing Co. CONTRACT NO: DAAA09-72-C-0360

CONTRACT TYPE: FSP (Progress Payments)

COMMODITY: Booster, M125A1, MPTS Assy w/M17 Detonator

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
6-30-72	AWARD			
11-10-72	133	$ 107731	.242	.024
11-30-72	153	253337	.279	.057
12-31-72	184	451223	.335	.101
1-20-73	204	384792	.372	.086
2-24-73	239	599359	.435	.134
3-11-73	254	636709	.463	.143
3-25-73	268	696117	.488	.156
3-31-73	274	762547	.499	.171
4-15-73	289	941868	.526	.211
4-30-73	304	1119305	.554	.251
5-13-73	317	1413874	.577	.317
6-30-73	365	1605250	.665	.360
7-31-73	396	1939904	.721	.435
8-15-73	411	2082476	.749	.467
8-31-73	427	2269805	.778	.509
9-15-73	442	2466047	.805	.553
9-30-73	457	2775462	.832	.622
10-14-73	471	2929748	.858	.657
10-31-73	488	3214029	.889	.721
11-18-73	506	3583823	.922	.804
11-30-73	518	3736313	.944	.838
12-15-73	533	4176263	.971	.937
12-31-73	549	4459171	1.000	1.000

FORM 6



WANG LABORATORIES, INC. 615 0784

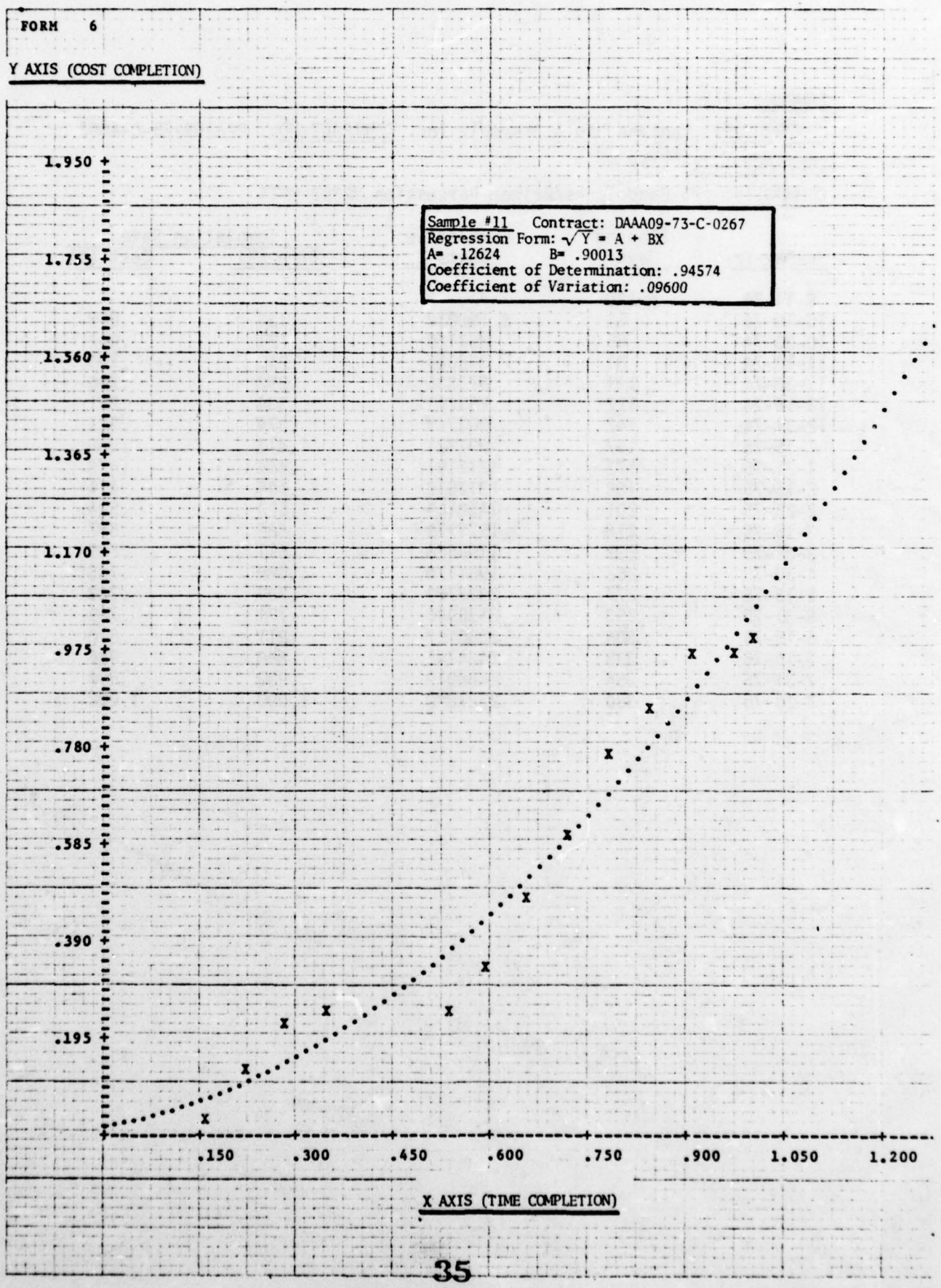
SAMPLE: #11

CONTRACTOR: Centron Corp. CONTRACT NO: DAAA09-73-C-0267

CONTRACT TYPE: FP w/Escalation

COMMODITY: Containers, Fiber f/105mm

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
5-31-73	AWARD			
8-15-73	76	$ 107619	.156	.032
9-15-73	107	450828	.220	.132
10-15-73	137	768594	.281	.225
11-15-73	168	855911	.345	.251
2-15-74	260	856391	.534	.251
3-15-74	288	1151043	.591	.338
4-15-74	319	1633006	.655	.479
5-15-74	349	2054088	.717	.603
6-15-74	380	2617283	.780	.768
7-15-74	410	2923298	.842	.858
8-15-74	441	3298019	.906	.968
9-16-74	473	3310418	.971	.971
9-30-74	487	3408416	1.000	1.000



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SAMPLE: #12

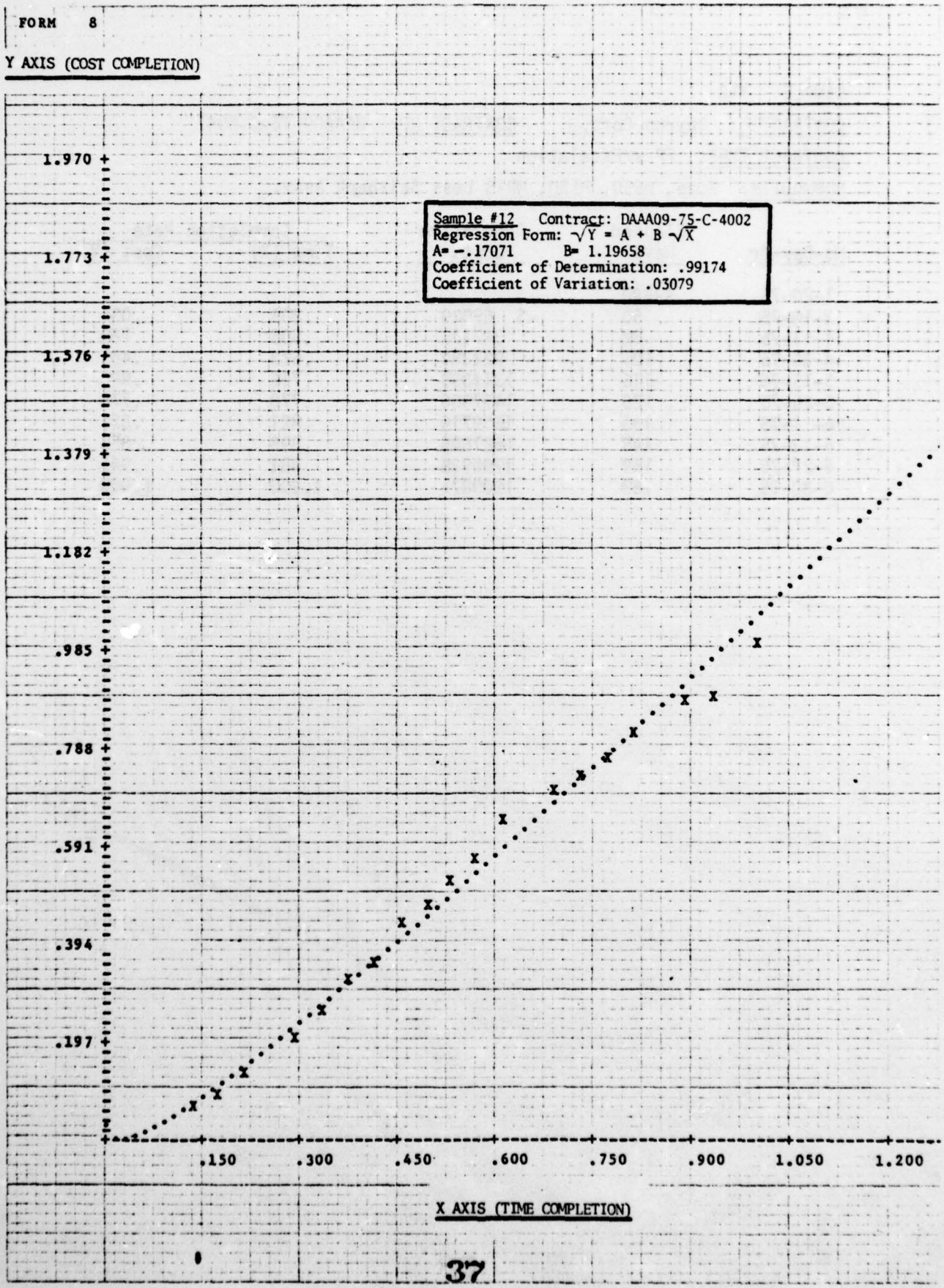
CONTRACTOR: Montana Mfg & Assembly Inc. CONTRACT NO: DAAA09-75-C-4002

CONTRACT TYPE: FFP

COMMODITY: M3 Bandoleers/Primer Percussion M28B2 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Cost (Y)
8-11-74	AWARD			
10-18-74	51	$ 188830	.134	.068
10-30-74	65	257129	.171	.092
11-14-74	81	376069	.213	.135
11-30-74	111	573836	.292	.206
12-16-74	127	725271	.334	.261
12-31-74	142	903749	.374	.325
1-15-75	157	997221	.413	.358
1-31-75	173	1217191	.455	.438
2-15-75	188	1317512	.495	.474
2-28-75	201	1458109	.529	.524
3-15-75	216	1577773	.568	.567
3-31-75	232	1794528	.611	.645
4-30-75	262	1961170	.689	.705
5-15-75	277	2037779	.729	.733
5-31-75	293	2138946	.771	.769
6-15-75	308	2280187	.811	.820
7-15-75	338	2464742	.889	.886
7-31-75	354	2488019	.932	.894
8-26-75	380	2781800	1.000	1.000

FORM 8


Y AXIS (COST COMPLETION)
1.970
1.773
1.576
1.379
1.182
.985
.788
.591
.394
.197
Sample #12 Contract: DAAA09-75-C-4002
Regression Form: √Y = A + B √X
A= -.17071 B= 1.19658
Coefficient of Determination: .99174
Coefficient of Variation: .03079
.150
.300
.450
.600
.750
.900
1.050
1.200
X AXIS (TIME COMPLETION)

SAMPLE: #13

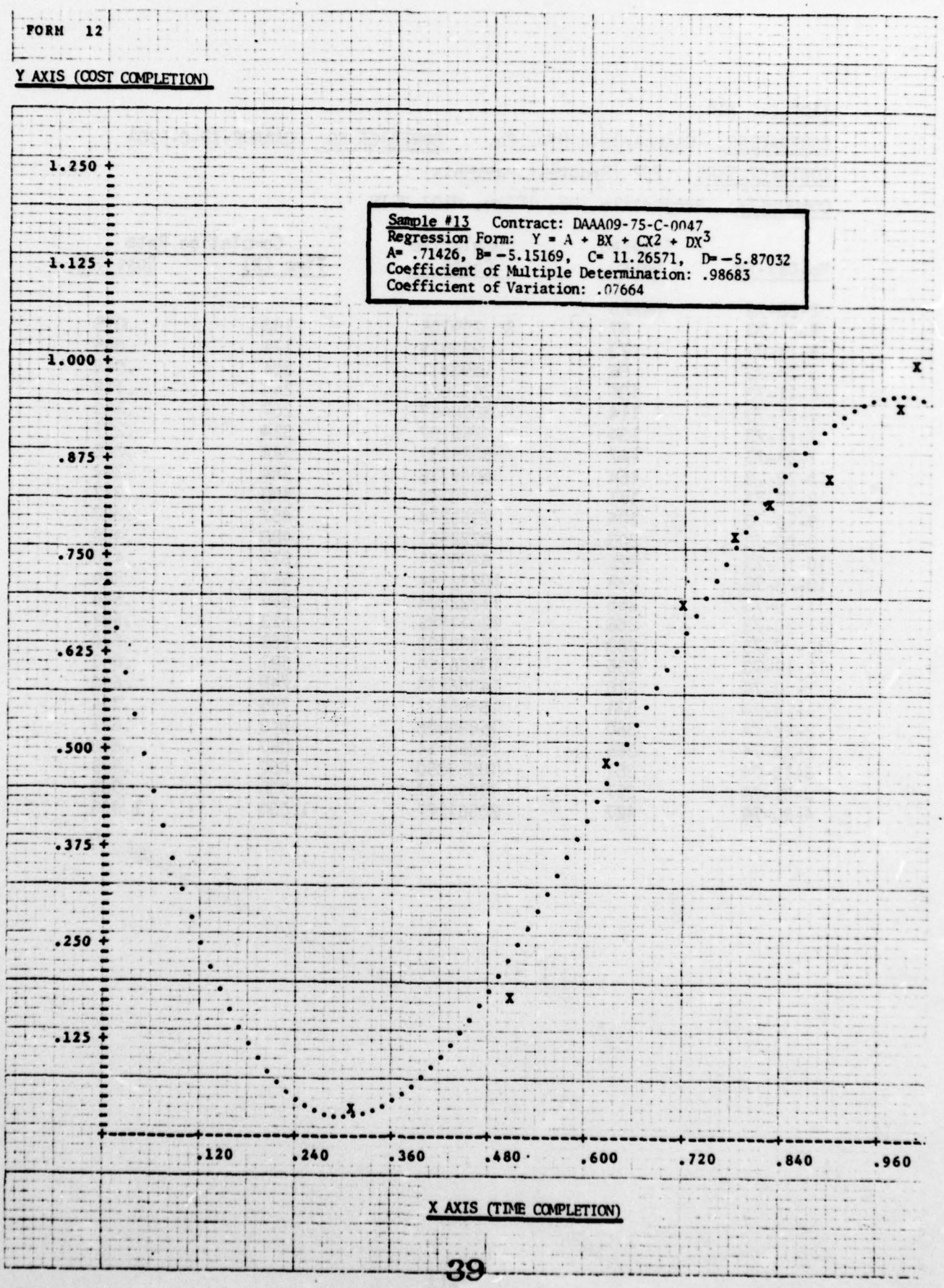
CONTRACTOR: Dayron Corp. CONTRACT NO: DAAA09-75-C-0047

CONTRACT TYPE: FP w/Escalation

COMMODITY: Fuze, M550, PIBD, MPTS Less Spitback Assy.

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Cost (Y)
1-20-75	AWARD			
3-10-75	50	$ 69020	.309	.036
4-11-75	82	342183	.506	.180
4-30-75	101	921387	.623	.485
5-15-75	116	1311398	.716	.690
5-25-75	126	1477966	.778	.778
6- 1-75	133	1559714	.821	.821
6-13-75	145	1621845	.895	.853
6-27-75	159	1795938	.981	.945
6-30-75	162	1900871	1.000	1.000

FORM 12



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OF 31

SAMPLE: #14

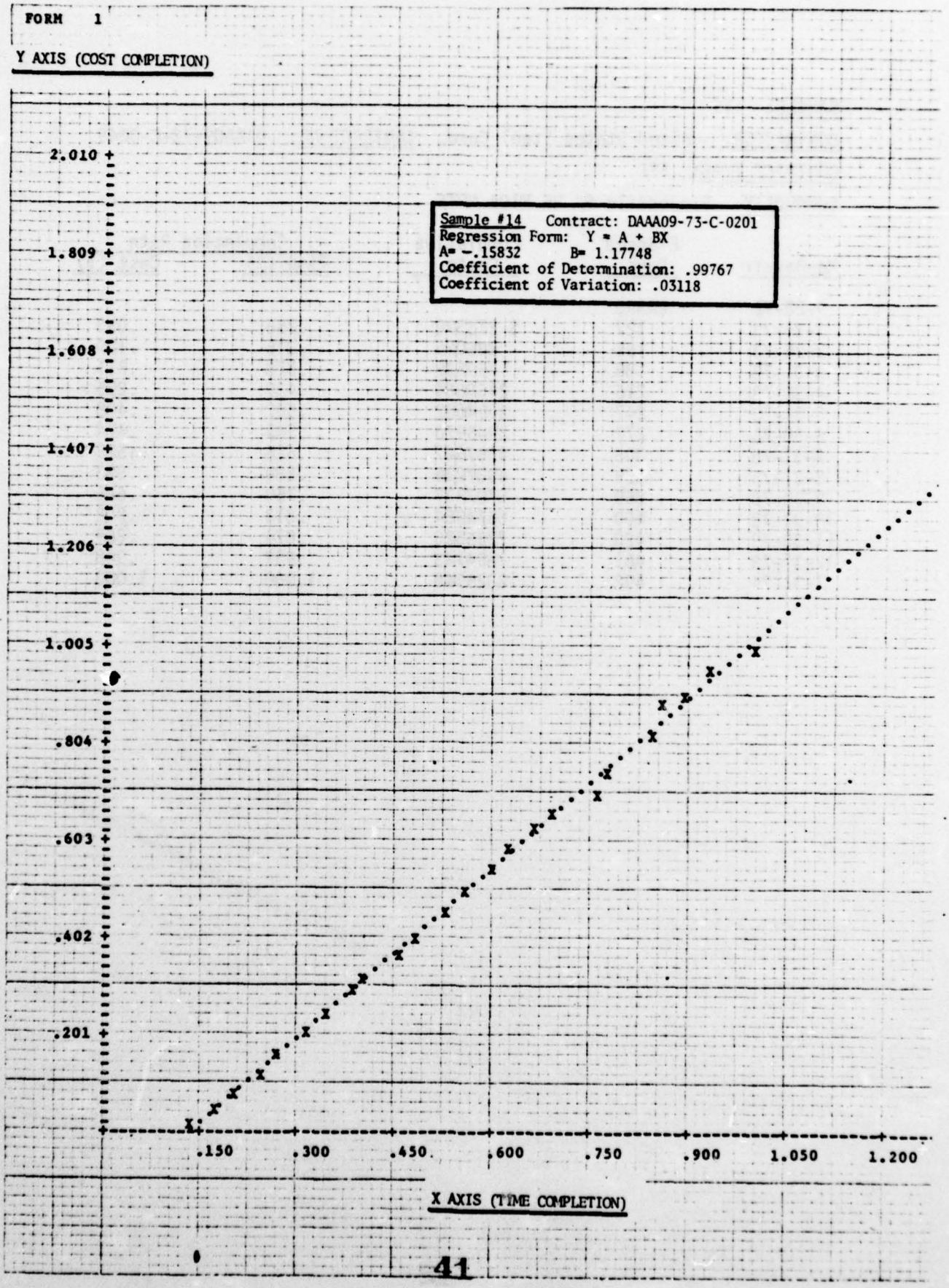
CONTRACTOR: Chamberlain Mfg. Co. CONTRACT NO: DAAA09-73-C-0201

CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Projectile, HE, 155mm, M107 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
2-28-73	AWARD			
4-25-73	57	$ 299105	.133	.015
5-11-73	73	929039	.171	.045
5-24-73	86	1593811	.201	.078
6-11-73	104	2430041	.244	.118
6-21-73	114	3298487	.267	.160
7-11-73	134	4255107	.314	.207
7-24-73	147	5029337	.344	.245
8-10-73	164	6049736	.384	.294
8-17-73	171	6510742	.400	.317
9-10-73	195	7555234	.457	.367
9-20-73	205	8222951	.480	.400
10-10-73	225	9380021	.527	.456
10-23-73	238	10272184	.557	.500
11- 9-73	255	11222874	.597	.546
11-20-73	266	12071685	.623	.587
12- 7-73	283	12933393	.663	.630
12-19-73	295	13566460	.691	.660
1- 9-74	316	14356230	.740	.698
1-24-74	331	15306637	.775	.744
2-22-74	360	16888008	.843	.821
2-28-74	366	18260154	.857	.888
3-15-74	381	18559850	.892	.903
3-31-74	397	19696787	.930	.958
4-30-74	427	20561227	1.000	1.000

FORM 1



WANG LABORATORIES, INC 615 0294

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SAMPLE: #15

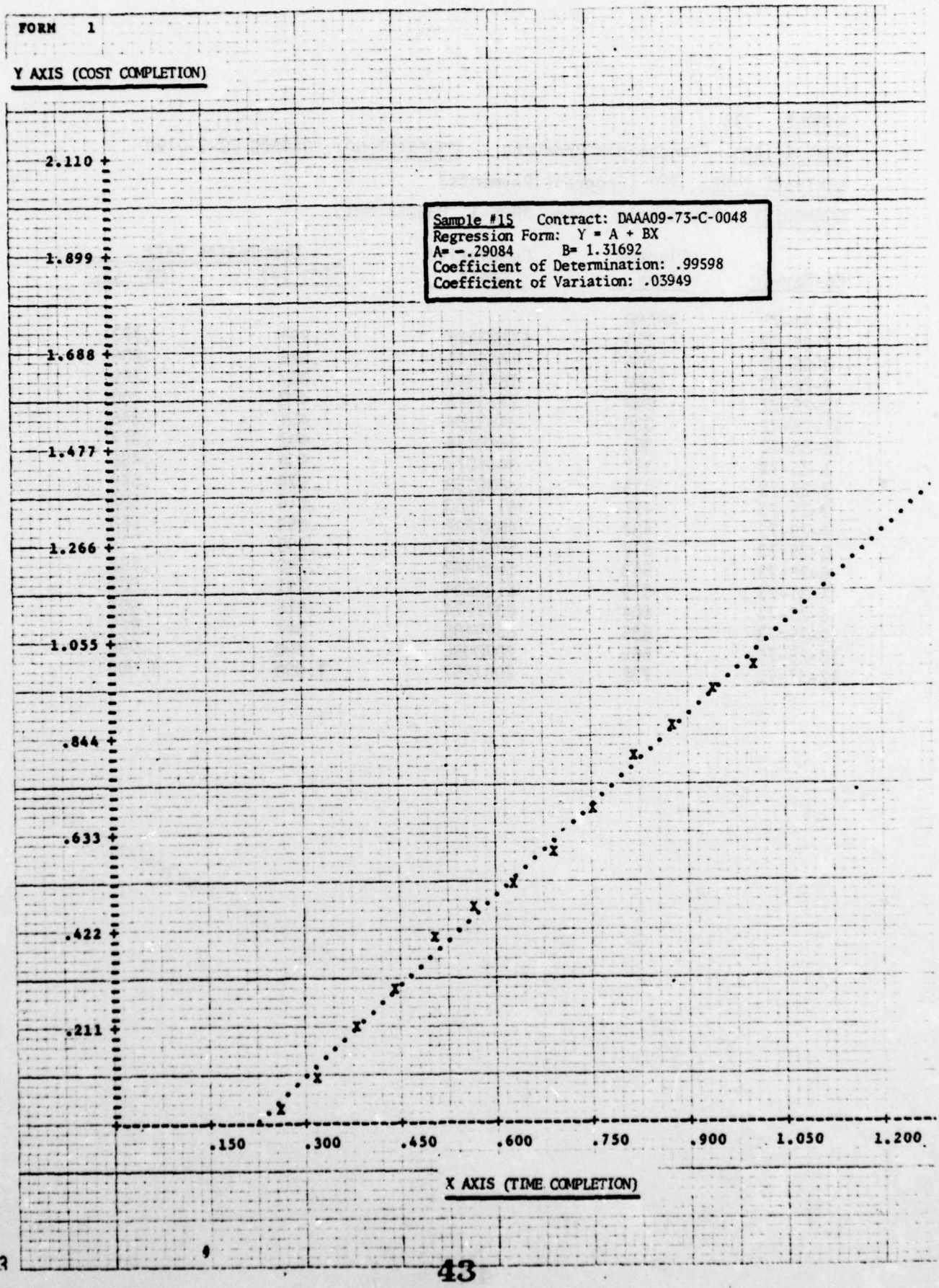
CONTRACTOR: United States Steel Corp. CONTRACT NO: DAAA09-73-C-0048

CONTRACT TYPE: FFP

COMMODITY: Projectile 8" HE M106 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Cost (Y)
9-28-72	AWARD			
1-31-73	127	$ 276390	.258	.033
2-28-73	155	836056	.315	.100
3-31-73	186	1759635	.378	.211
4-30-73	216	2458884	.439	.295
5-31-73	247	3394602	.502	.408
6-30-73	277	3945970	.563	.474
7-31-73	308	4367047	.626	.525
8-31-73	339	4937226	.689	.593
9-30-73	369	5707937	.750	.686
10-31-73	400	6674964	.813	.802
11-30-73	430	7235526	.874	.869
12-31-73	461	7894743	.937	.948
1-31-74	492	8325748	1.000	1.000

FORM 1


Y AXIS (COST COMPLETION)
2.110
1.899
1.688
1.477
1.266
1.055
.844
.633
.422
.211
Sample #15 Contract: DAAA09-73-C-0048
Regression Form: Y = A + BX
A= -.29084 B= 1.31692
Coefficient of Determination: .99598
Coefficient of Variation: .03949
.150
.300
.450
.600
.750
.900
1.050
1.200
X AXIS (TIME COMPLETION)

SAMPLE: #16

CONTRACTOR: Flinchbaugh Products CONTRACT NO: DAAA09-72-C-0190

CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Projectile 105mm, APDS-T, M392A1 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
12-31-71	AWARD			
7-31-72	213	$1227838	.291	.173
8-25-72	238	1456245	.325	.206
9-25-72	269	1841398	.367	.260
10-25-72	299	2123828	.408	.300
11-25-72	330	2453354	.451	.346
12-25-72	360	2668274	.492	.377
1-25-73	392	3444012	.536	.486
2-25-73	423	3886358	.578	.549
3-25-73	451	4118683	.616	.582
4-25-73	482	4697096	.658	.663
5-25-73	512	5090223	.699	.719
6-25-73	543	5609942	.742	.792
7-31-73	579	6183534	.791	.873
8-25-73	604	6377274	.825	.901
9-25-73	635	6549488	.867	.925
10-25-73	665	7070556	.908	.998
12-31-73	732	7081257	1.000	1.000

X AXIS (TIME COMPLETION)

FORM 8

Y AXIS (COST COMPLETION)

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Sample #16 Contract: DAAA09-72-C-0190
Regression Form: $\sqrt{Y} = A + B\sqrt{X}$
A= -.33901 B= 1.40134
Coefficient of Determination: .98813
Coefficient of Variation: .02962

1.250
1.125
1.000
.875
.750
.625
.500
.375
.250
.125

.120 .240 .360 .480 .600 .720 .840 .960

X AXIS (TIME COMPLETION)

SAMPLE: #17

CONTRACTOR: Norris Industries, Inc. CONTRACT NO: DAAA09-75-C-0048

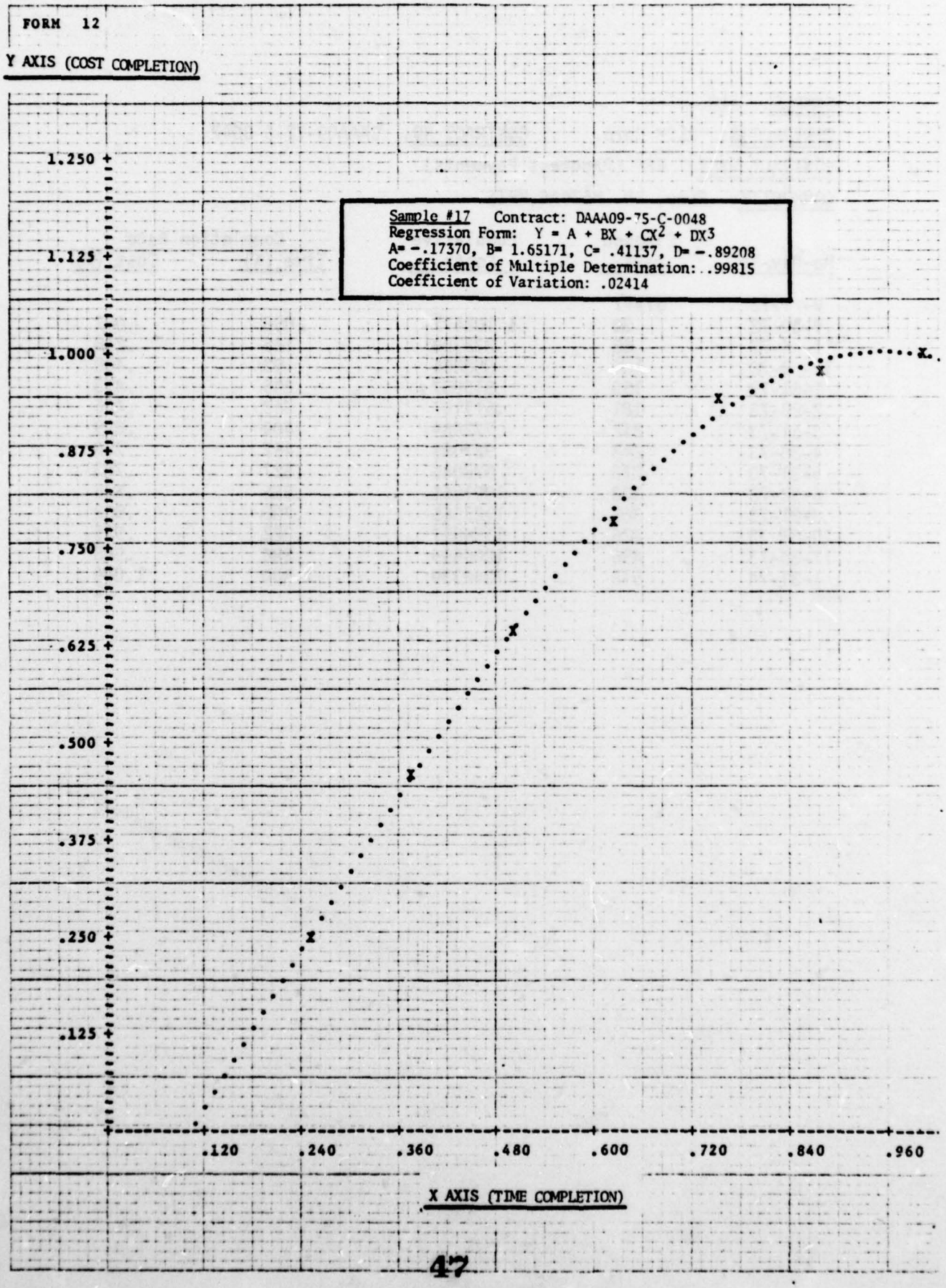
CONTRACT TYPE: FP w/Escalation

COMMODITY: Case, Cartridge, 105mm, M14B4, Level A&C Pack

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
2-14-75	AWARD			
4-15-75	61	$1473084	.250	.249
5-15-75	91	2710687	.373	.459
6-15-75	122	3796154	.500	.643
7-15-75	152	4630842	.623	.784
8-15-75	183	5563992	.750	.942
9-15-75	214	5770224	.877	.977
10-15-75	244	5907516	1.000	1.000

FORM 12

Y AXIS (COST COMPLETION)



X AXIS (TIME COMPLETION)

WANG LABORATORIES, INC. 615-0004

SAMPLE: #18

CONTRACTOR: REDM Corp. CONTRACT NO: DAAA09-72-C-0047

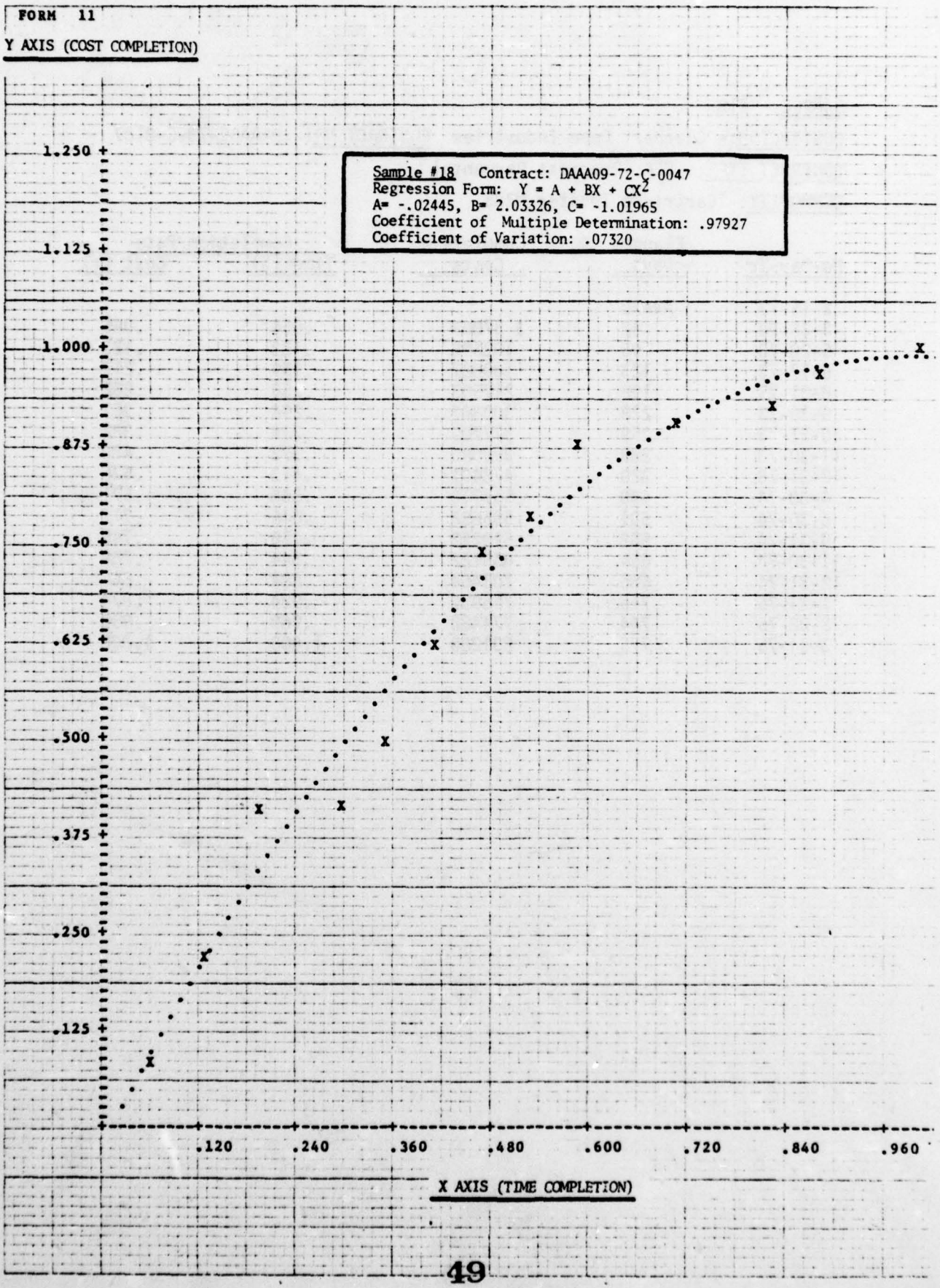
CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Fuze, PD, M524A6 MPTS

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
9- 1-72	START			
9-30-72	30	$ 102477	.058	.082
11- 4-72	65	272390	.125	.218
12- 9-72	100	508866	.193	.408
1-31-73	153	515957	.295	.413
2-28-73	181	619197	.349	.496
3-31-73	212	772989	.409	.619
4-30-73	242	921085	.467	.738
5-31-73	273	978045	.527	.783
6-30-73	303	1091965	.585	.875
8-31-73	365	1127565	.705	.903
10-31-73	426	1154827	.822	.925
11-30-73	456	1204995	.880	.965
1-31-74	518	1248339	1.000	1.000

FORM 11

Y AXIS (COST COMPLETION)



SAMPLE: #19

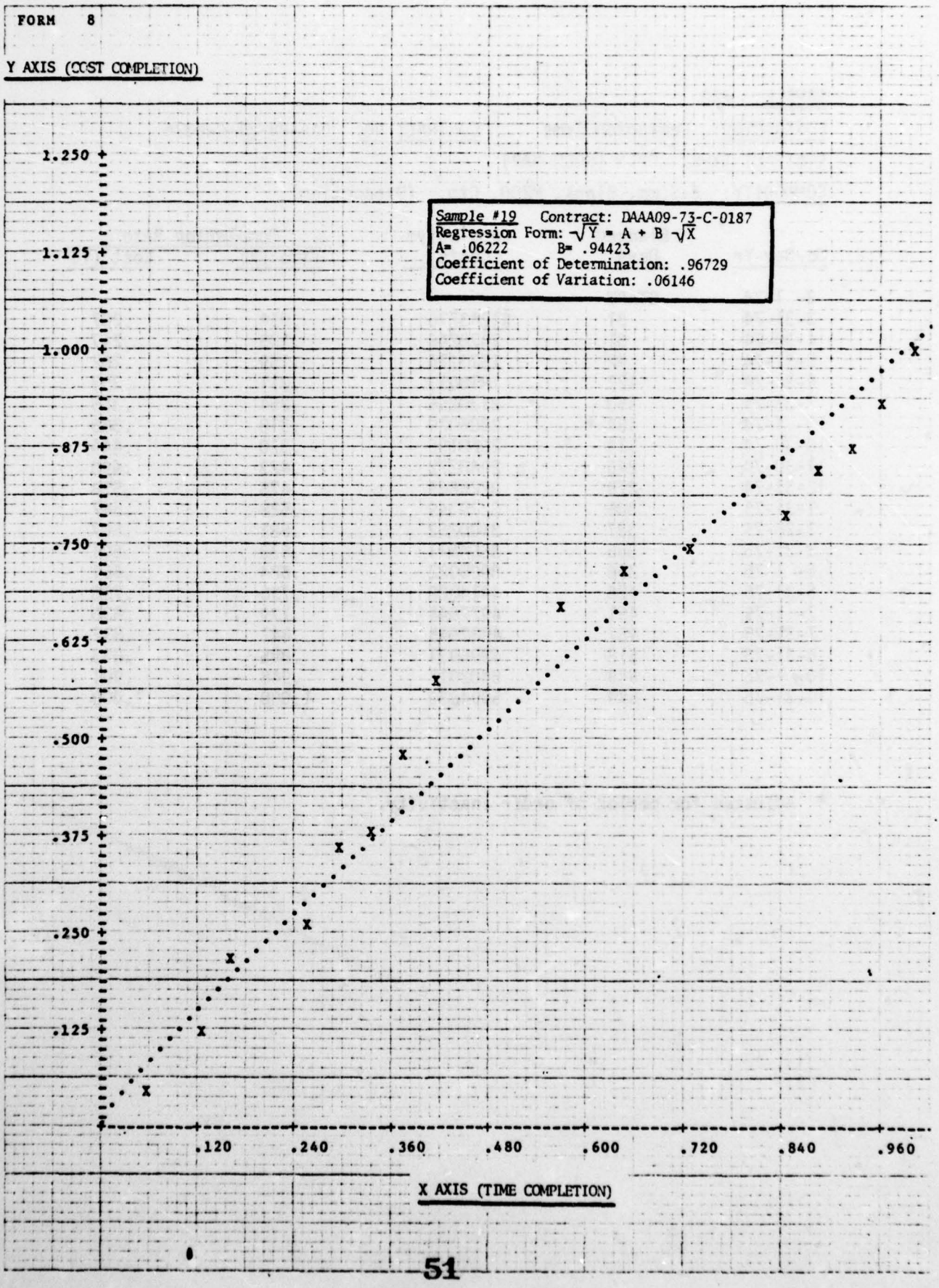
CONTRACTOR: Gearhart Owen Industries CONTRACT NO: DAAA09-73-C-0187

CONTRACT TYPE: FFP (Progress Payments)

COMMODITY: Cartridge Igniter M285

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
2-15-73	AWARD			
3-28-73	42	$ 37089	.054	.045
5-20-73	95	102596	.123	.123
6-17-73	123	180027	.159	.217
8-31-73	198	217503	.255	.262
9-30-73	228	300307	.294	.361
10-31-73	259	317709	.334	.382
11-30-73	289	399090	.373	.480
12-31-73	320	478401	.413	.576
4-30-74	440	557710	.568	.671
6-30-74	501	595658	.646	.717
8-31-74	563	619222	.726	.745
11-30-74	654	655122	.844	.788
12-31-74	685	703464	.884	.846
1-31-75	716	726930	.924	.874
2-28-75	744	774482	.960	.932
3-31-75	775	831255	1.000	1.000

FORM 8



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SAMPLE: #20

CONTRACTOR: Pemington Arms CONTRACT NO: DAAA09-71-C-0316

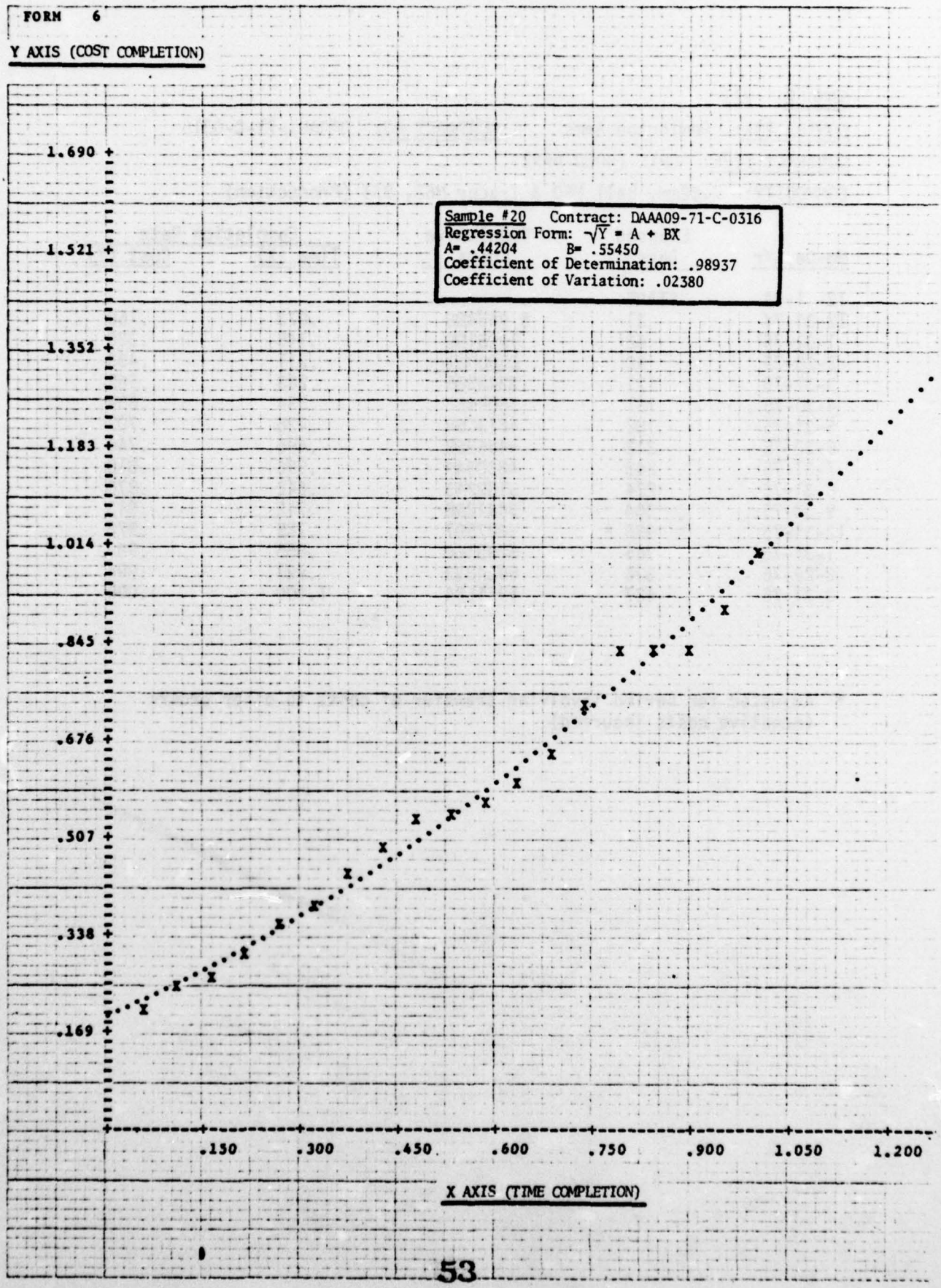
CONTRACT TYPE: CPIF (GOCO AAP)

COMMODITY: 5.56mm, Blank, M200, Ctn. (Production)

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
3- 1-74	START			
3-31-74	31	$1243776	.054	.207
4-30-74	61	1478246	.105	.247
5-31-74	92	1573274	.159	.262
6-30-74	122	1818033	.211	.303
7-31-74	153	2130296	.264	.355
10- 1-74	184 *	2326029	.318	.388
10-30-74	214	2660156	.370	.444
11-30-74	245	2940272	.423	.490
12-31-74	275	3226665	.475	.538
1-31-75	306	3279349	.528	.547
2-28-75	337	3400252	.582	.567
3-31-75	365	3604511	.630	.601
5- 1-75	396	3905022	.684	.651
5-31-75	426	4414808	.736	.736
7- 1-75	451	4977644	.779	.830
7-31-75	487	4987645	.841	.832
8-31-75	518	4995931	.895	.833
10- 1-75	549	5402017	.948	.901
10-31-75	579	5994830	1.000	1.000

* Adjusted for period of order inactivity.

FORM 6



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SAMPLE: #21

CONTRACTOR: Remington Arms CONTRACT NO: DAAA09-71-C-0316

CONTRACT TYPE: CPIF (GOCO AAP)

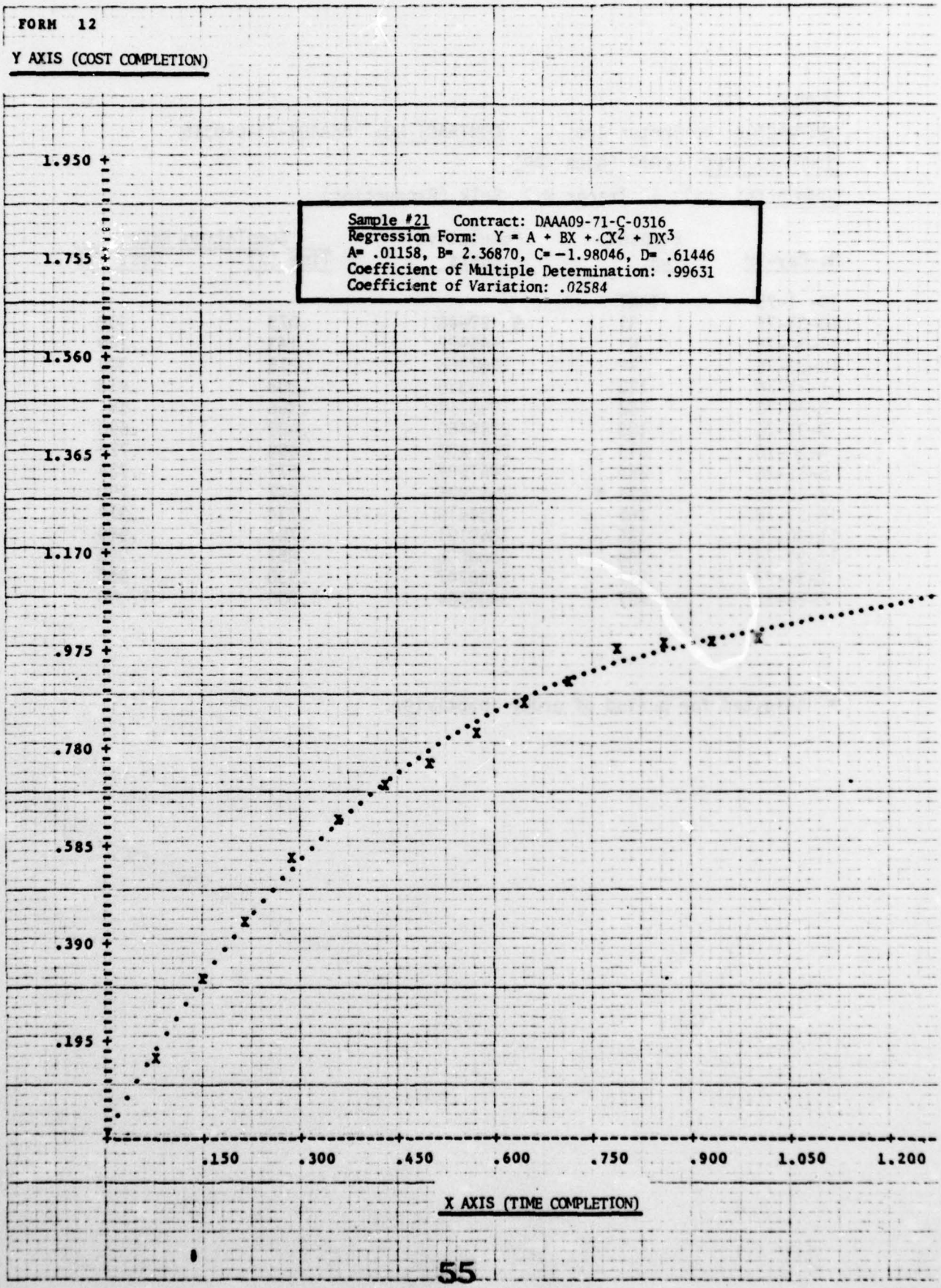
COMMODITY: 7.62mm, Ball M80 & Tracer M62, 9/1 (Production)

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate	
			Time (X)	Cost (Y)
12- 1-74	START			
12-31-74	31	$ 955486	.073	.160
1-31-75	62	1906105	.145	.320
2-28-75	90	2580061	.211	.433
3-31-75	121	3348565	.283	.562
4-30-75	151	3809452	.354	.639
5-31-75	182	4213568	.426	.707
6-30-75	212	4466968	.496	.749
7-31-75	243	4830949	.596	.810
8-31-75	274	5189243	.642	.870
9-30-75	304	5441298	.712	.913
12-31-75	335 *	5827587	.785	.978
1-31-76	365	5893160	.855	.989
2-29-76	396	5924833	.927	.994
3-31-76	427	5961584	1.000	1.000

* Adjusted for period involving transfer of costs to other orders (negative costs incurred).

FORM 12

Y AXIS (COST COMPLETION)



SAMPLE: #22

CONTRACTOR: Remington Arms CONTRACT NO: DAAA09-71-C-0316

CONTRACT TYPE: CPIF (GOCO AAP)

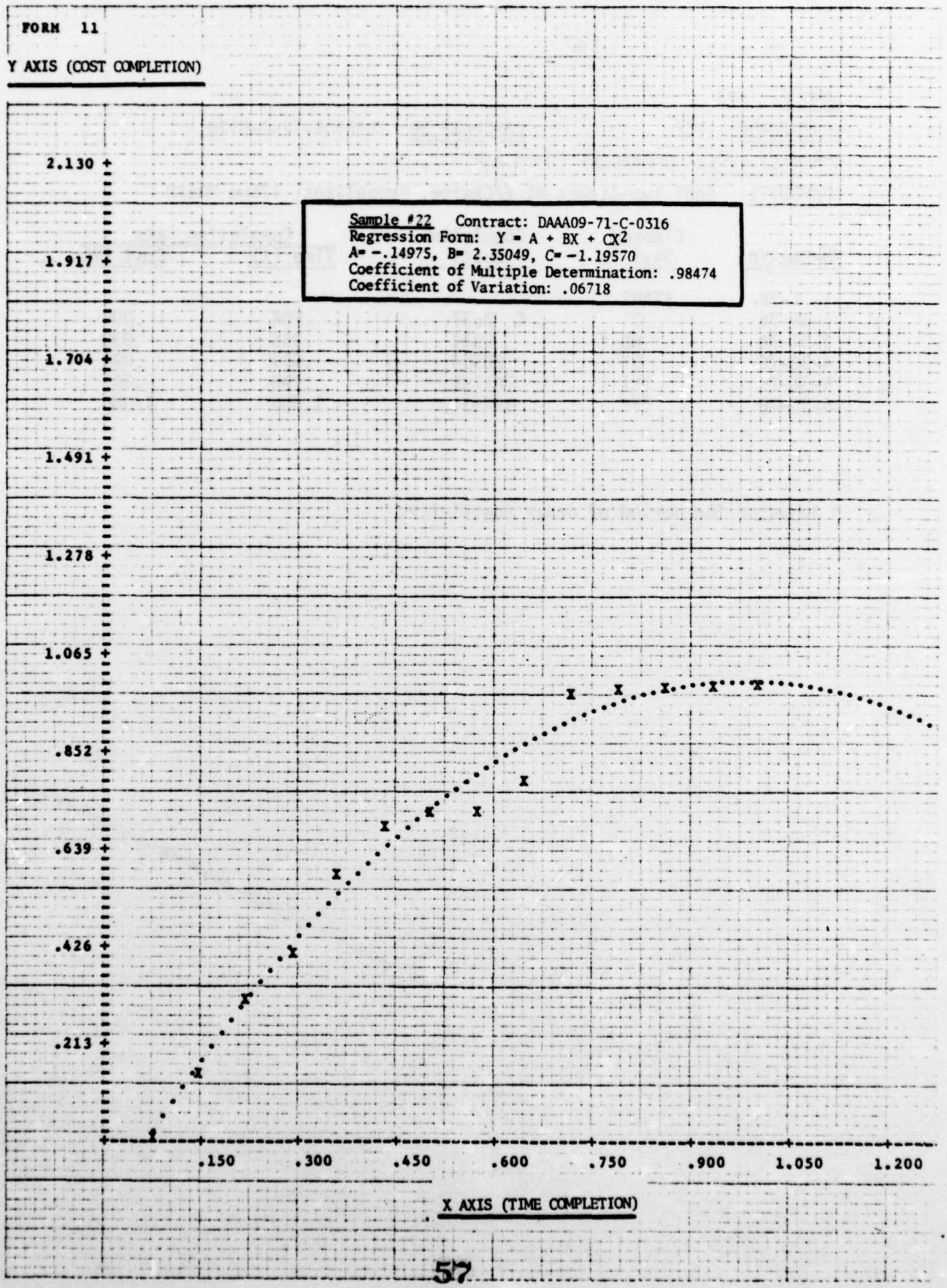
COMMODITY: Cal .50 Tracer M17, Bulk (Production)

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
10- 1-75	START			
10-31-75	31	$ 27648	.073	.008
11-30-75	61	505922	.143	.149
12-31-75	92	1052755	.215	.309
1-31-76	123	1408330	.288	.413
2-29-76	152	1990718	.356	.584
3-31-76	183	2349660	.429	.690
4-30-76	213	2460200	.499	.722
5-31-76	244	2467587	.571	.724
9-30-76	274 *	2692285	.642	.790
10-31-76	305	3334610	.714	.979
11-30-76	336	3369191	.787	.989
12-31-76	366	3380806	.857	.993
1-31-77	397	3390747	.930	.996
2-28-77	427	3406064	1.000	1.000

* Adjusted for period of order inactivity.

FORM 11

Y AXIS (COST COMPLETION)



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SAMPLE: #23

CONTRACTOR: ICI CONTRACT NO: DAAA09-72-C-0170

CONTRACT TYPE: CPAF/CPFF (GOCO AAP)

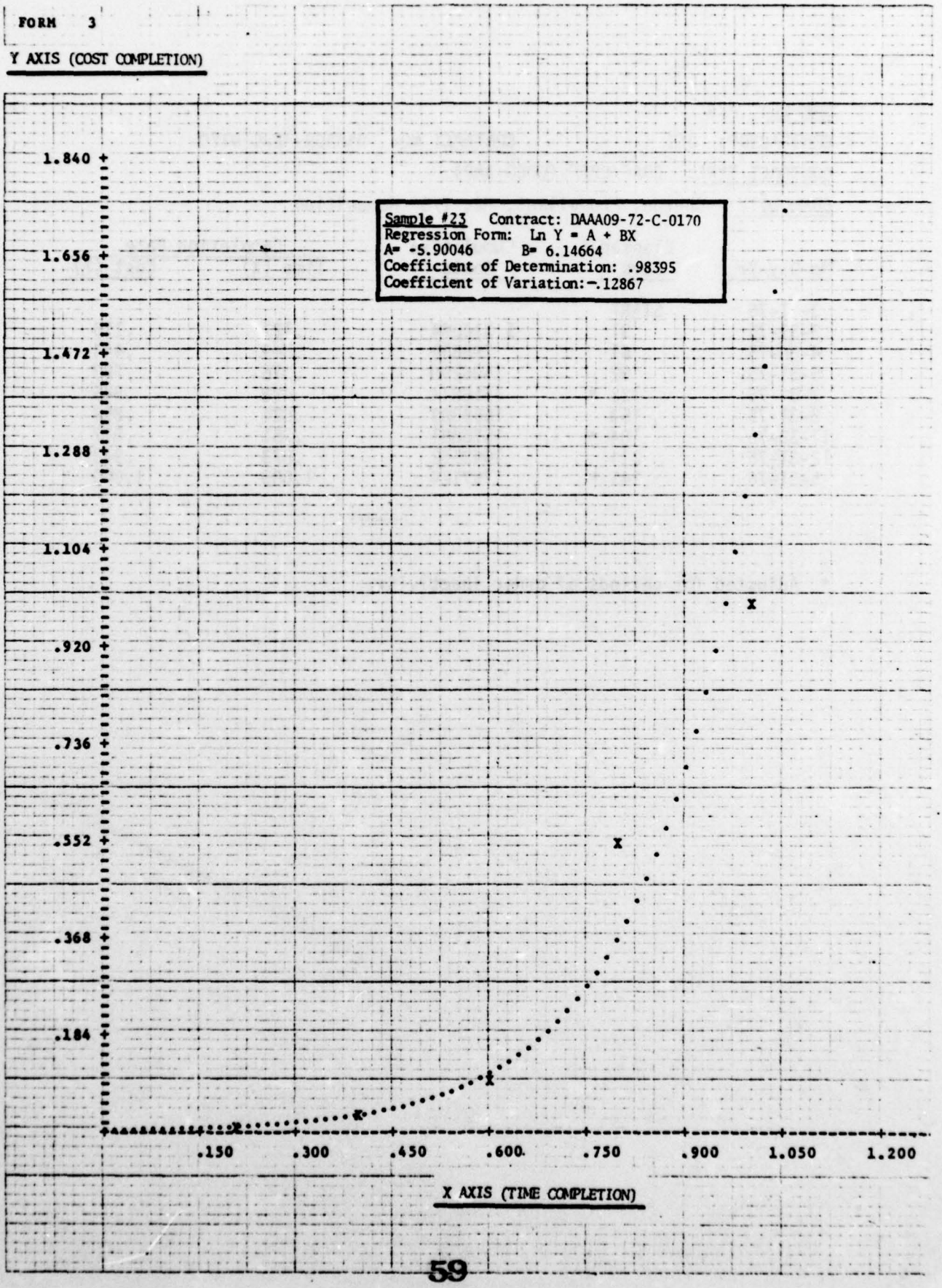
COMMODITY: Additive Jacket M1 f/Charge, Propellant, 175mm M86A2

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate	
			Time (X)	Cost (Y)
1- 1-76	START			
1-31-76	31	$ 2537	.204	.009
3-31-76	60 *	9354	.395	.032
4-30-76	91	28354	.599	.096
5-31-76	121	161185	.796	.547
6-30-76	152	294531	1.000	1.000

* Adjusted for period of order inactivity.

FORM 3

Y AXIS (COST COMPLETION)



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SAMPLE: #24

CONTRACTOR: ICI CONTRACT NO: DAAA09-72-C-0170

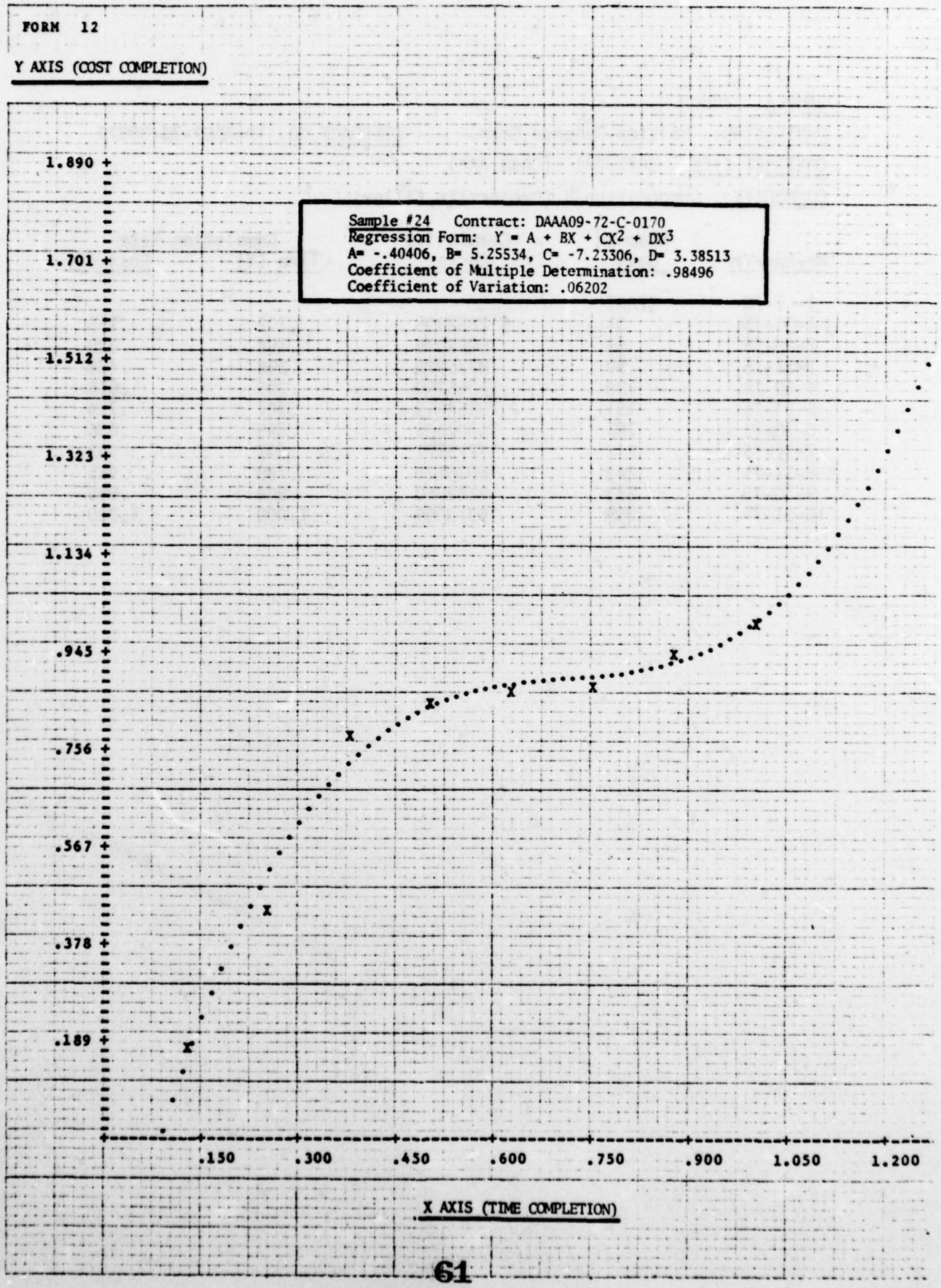
CONTRACT TYPE: CPAF/CPFF (GOCO AAP)

COMMODITY: Charge, Propellant, M2, f/8" Ammunition

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
3- 1-75	START			
3-31-75	31	$ 314044	.127	.175
4-30-75	61	798359	.249	.444
5-31-75	92	1406290	.376	.783
7-31-75	122 *	1518811	.498	.845
8-31-75	153	1559303	.624	.868
11-30-75	184 *	1576881	.751	.877
12-31-75	214	1693562	.873	.942
5-31-76	245 *	1797124	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 12



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SAMPLE: #25

CONTRACTOR: Holston Defense Corp. CONTRACT NO: DAAA09-73-C0079

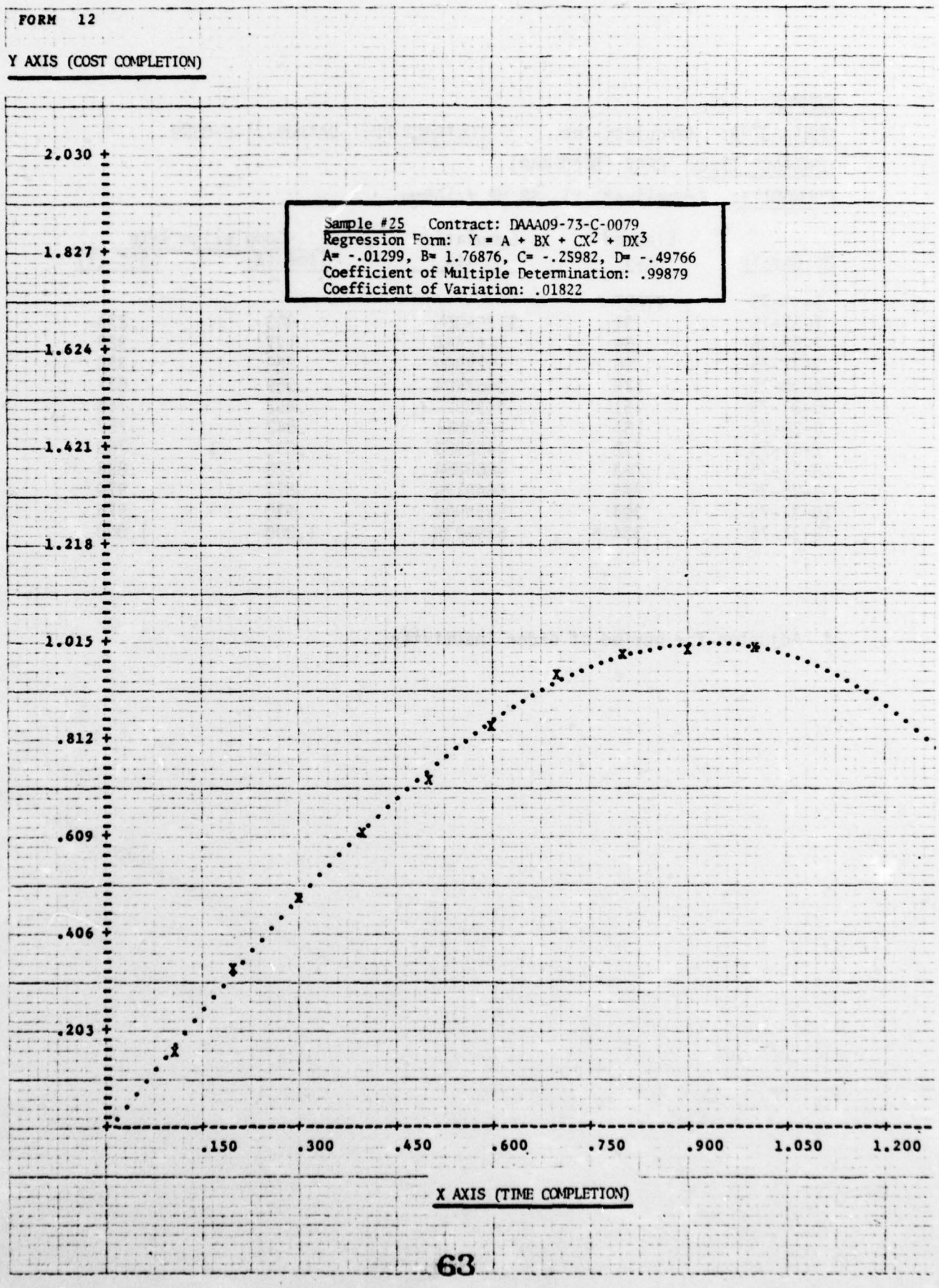
CONTRACT TYPE: CPFF/CPIF (GOCO AAP)

COMMODITY: Composition B (Projectile Filler)

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
1- 1-75	START			
1-31-75	31	$ 2852395	.102	.156
2-28-75	59	6027019	.194	.329
3-31-75	90	8775925	.296	.479
4-30-75	120	11255700	.395	.615
5-31-75	151	13264919	.497	.724
6-30-75	181	15307671	.595	.836
7-31-75	212	17275771	.697	.943
8-31-75	243	18030128	.799	.985
9-30-75	273	18243060	.898	.996
10-31-75	304	18313099	1.000	1.000

FORM 12

Y AXIS (COST COMPLETION)



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SAMPLE: #26

CONTRACTOR: Hercules, Inc. CONTRACT NO: DAAA09-71-C-0329

CONTRACT TYPE: CPFF (GOCO AAP)

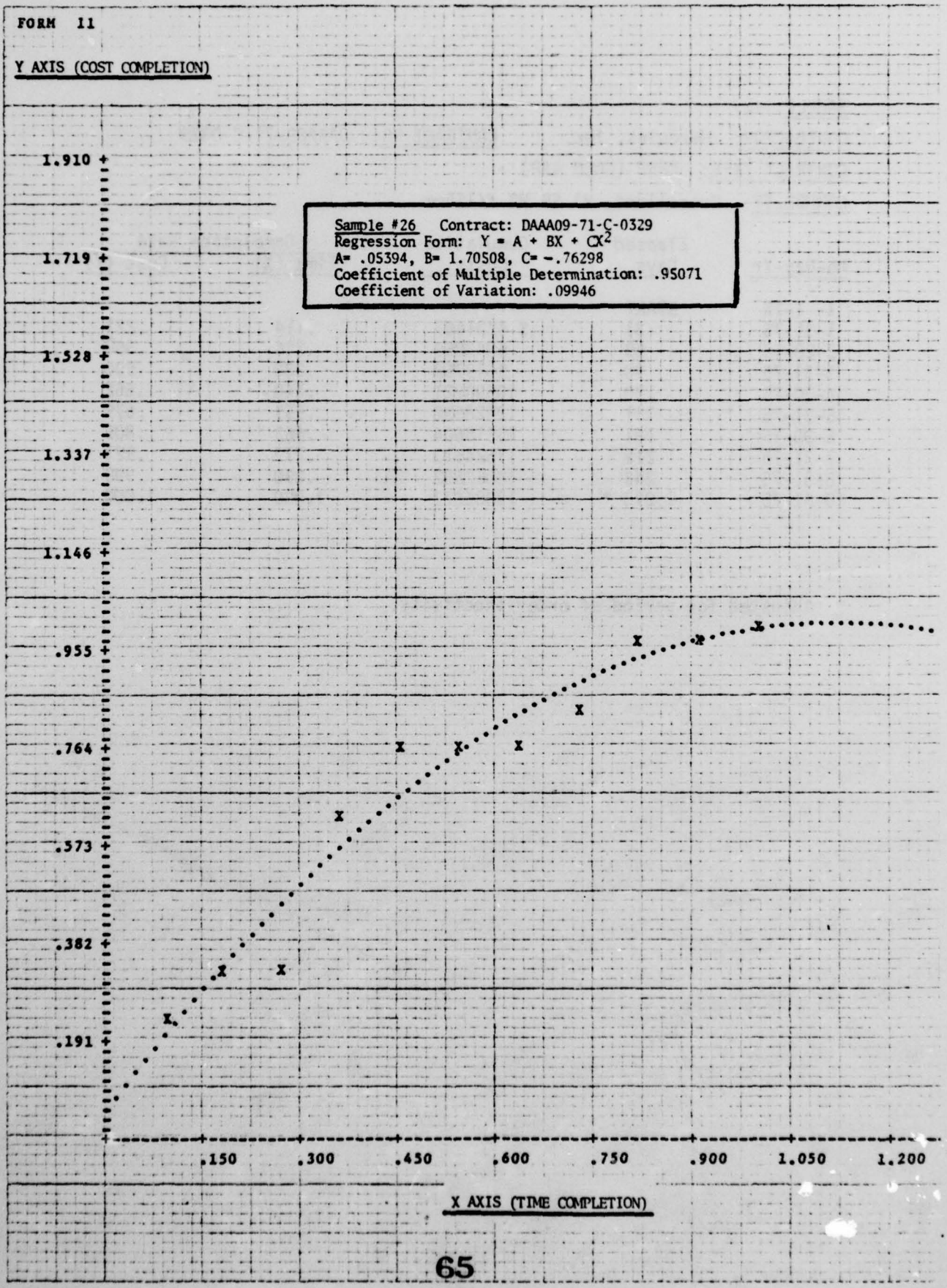
COMMODITY: Propellant, Ml, SB MP f/105mm

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Cost (Y)
1- 1-75	START			
1-31-75	31	$1355355	.093	.234
2-28-75	59	1897564	.177	.327
3-31-75	90	1927909	.269	.332
4-30-75	120	3657804	.359	.631
5-31-75	151	4438924	.452	.766
6-30-75	181	4448811	.542	.767
7-31-75	212	4452983	.635	.768
8-31-75	243	4863854	.728	.839
9-30-75	273	5648174	.817	.974
10-31-75	304	5654924	.910	.975
12-31-75	334 *	5798438	1.000	1.000

* Adjusted for period of order inactivity.

FORM 11

Y AXIS (COST COMPLETION)



D WANG LABORATORIES INC 619-0004

SAMPLE: #27

CONTRACTOR: Hercules, Inc. CONTRACT NO: DAAA09-71-C-0329

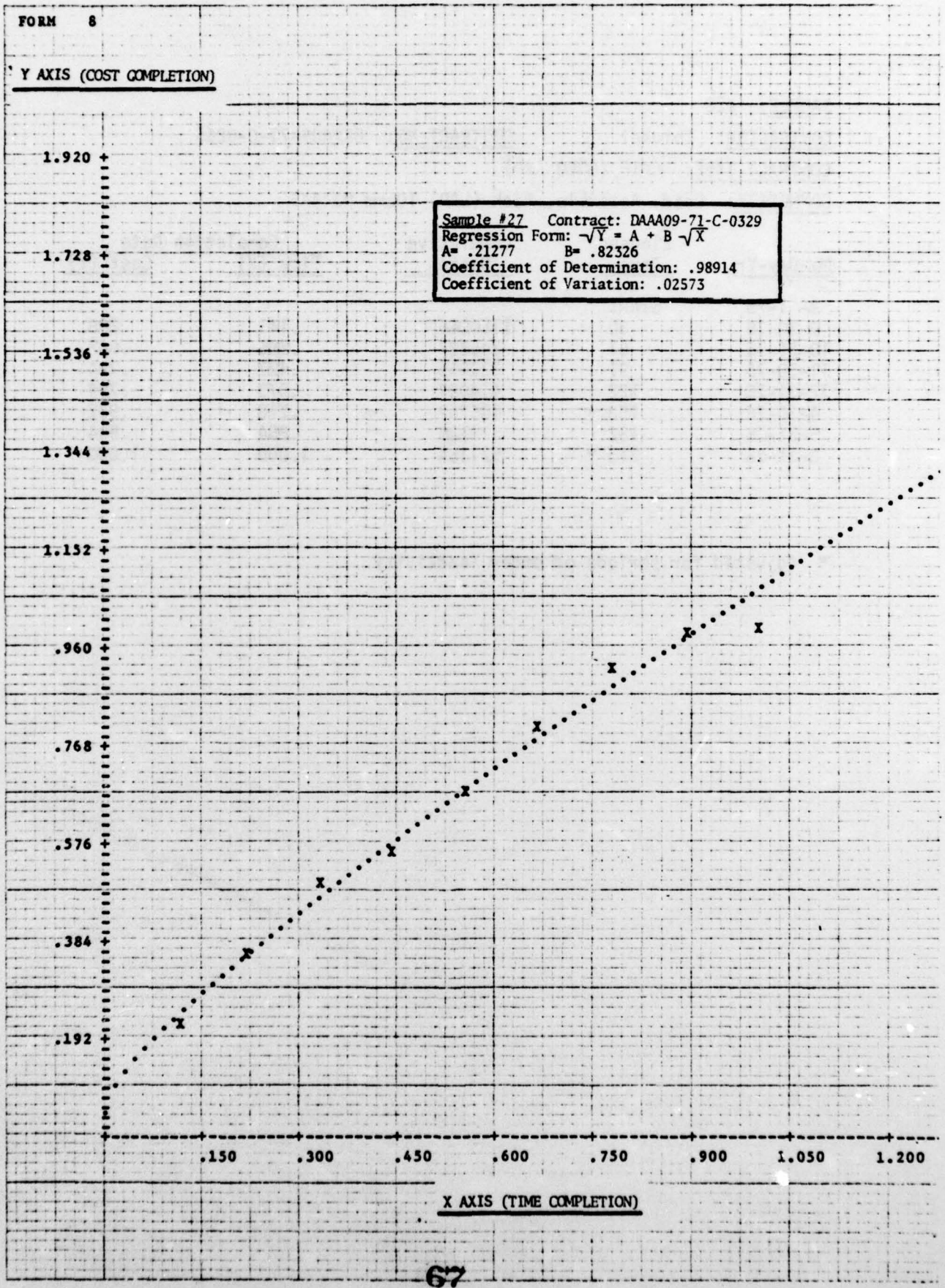
CONTRACT TYPE: CPFF (GOCO AAP)

COMMODITY: Propellant, M1 SB MP f/155mm

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
1- 1-75	START			
1-31-75	31	$ 4201487	.114	.221
2-28-75	59	6843859	.216	.360
3-31-75	90	9519758	.330	.500
4-30-75	120	10690821	.440	.562
5-31-75	151	12928588	.553	.679
6-30-75	181	15315604	.663	.805
7-31-75	212	17524513	.777	.921
8-31-75	243	18852682	.890	.990
10-31-75	273 *	19035873	1.000	1.000

* Adjusted for period of order inactivity.

FORM 8



WANG LABORATORIES, INC 615 0204

SAMPLE: #28

CONTRACTOR: Thiokol CONTRACT NO: DAAA09-71-C-0265

CONTRACT TYPE: CPIF (GOCO AAP)

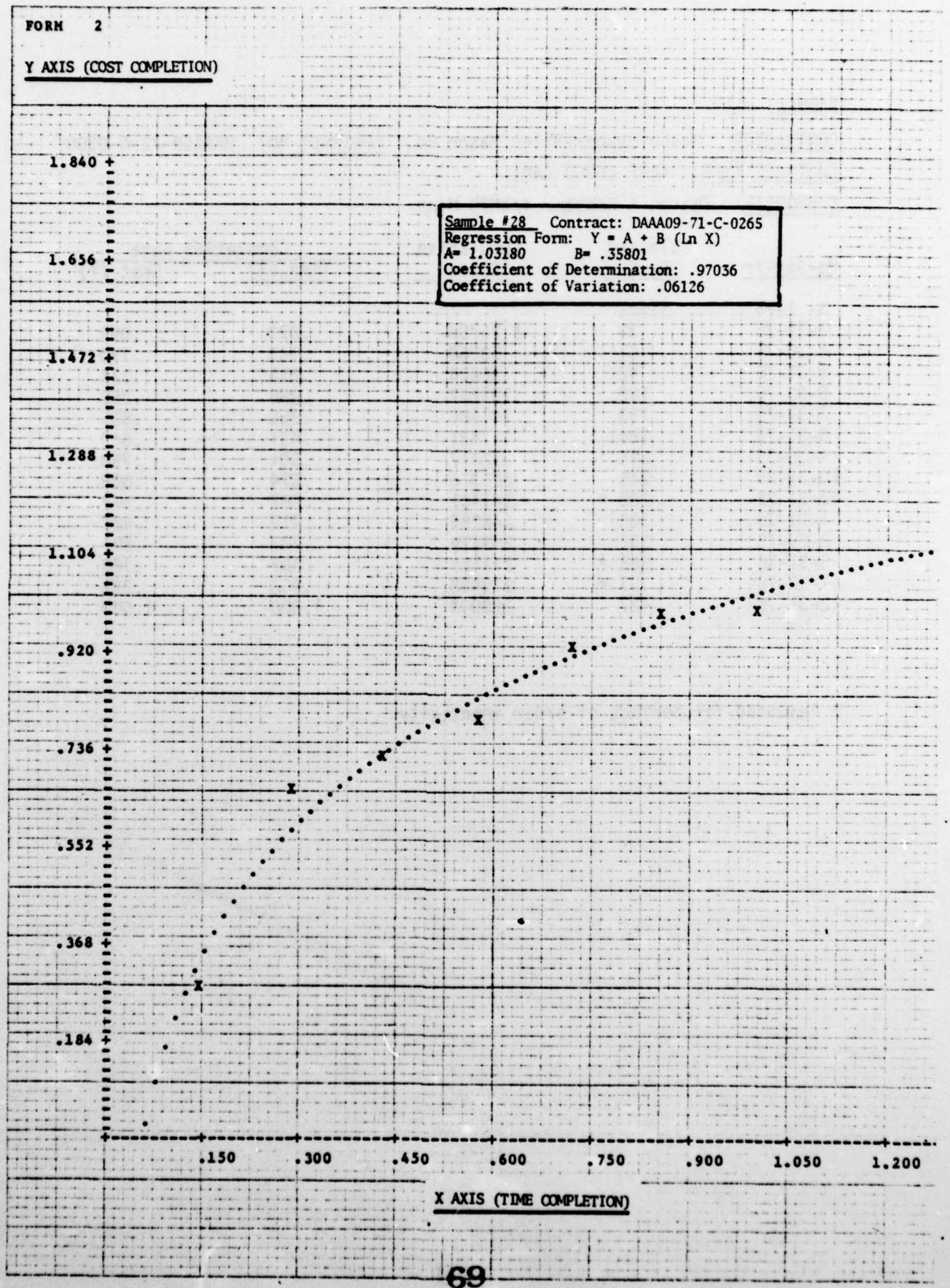
COMMODITY: Load, Assemble, Pack (LAP) 105mm M314A3

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
9- 1-75	START			
9-30-75	30	$150246	.141	.288
10-31-75	61	345227	.286	.662
11-30-75	91	377295	.427	.724
12-31-75	122	414027	.573	.794
4-30-76	153 *	485769	.718	.932
5-31-76	182	518120	.854	.994
8-31-76	213 *	521154	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 2

Y AXIS (COST COMPLETION)



Sample #28 Contract: DAAA09-71-C-0265
Regression Form: Y = A + B (Ln X)
A= 1.03180 B= .35801
Coefficient of Determination: .97036
Coefficient of Variation: .06126

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SAMPLE: #29

CONTRACTOR: Mason Hanger-Silas Mason Co. CONTRACT NO: DAAA09-72-C-0300

CONTRACT TYPE: CPAF (GOCO AAP)

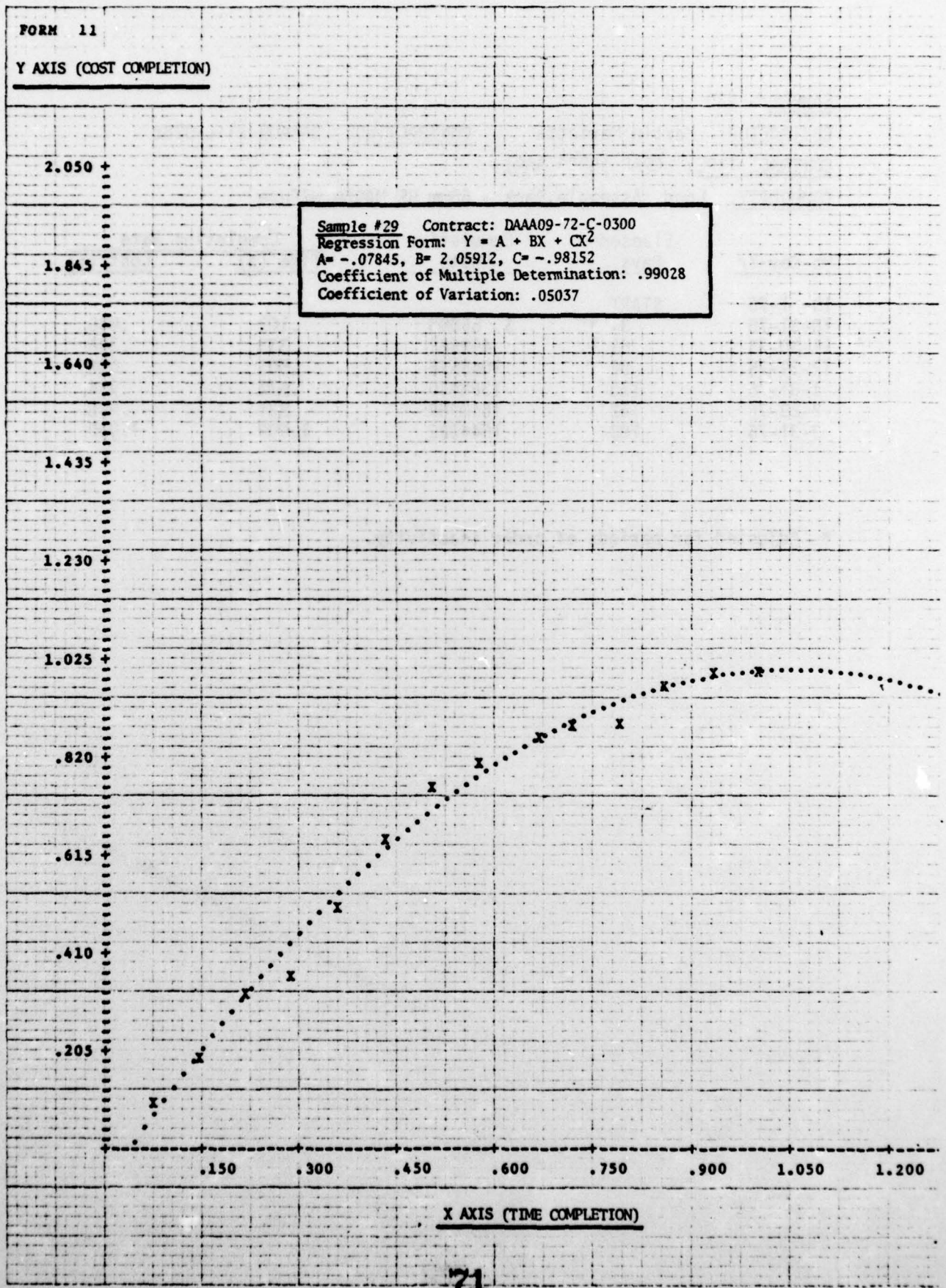
COMMODITY: Charge & Booster f/XM70 Mine

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
3- 1-75	START			
3-31-75	31	$ 26738	.073	.095
4-30-75	61	53260	.143	.190
5-31-75	92	90604	.215	.324
6-30-75	122	101247	.286	.362
7-31-75	153	141406	.358	.505
8-31-75	184	181831	.431	.649
9-30-75	214	212317	.501	.758
10-31-75	245	226376	.574	.808
12-31-75	285 *	241401	.667	.862
1-31-76	306	248255	.717	.887
2-29-76	337	249579	.789	.891
8-31-76	366 *	271159	.857	.968
11-30-76	397 *	279488	.930	.998
12-31-76	427	280000	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 11

Y AXIS (COST COMPLETION)



SAMPLE: #30

CONTRACTOR: Martin Marietta CONTRACT NO: DAAA09-71-C-0288

CONTRACT TYPE: CPAF (GOCO AAP)

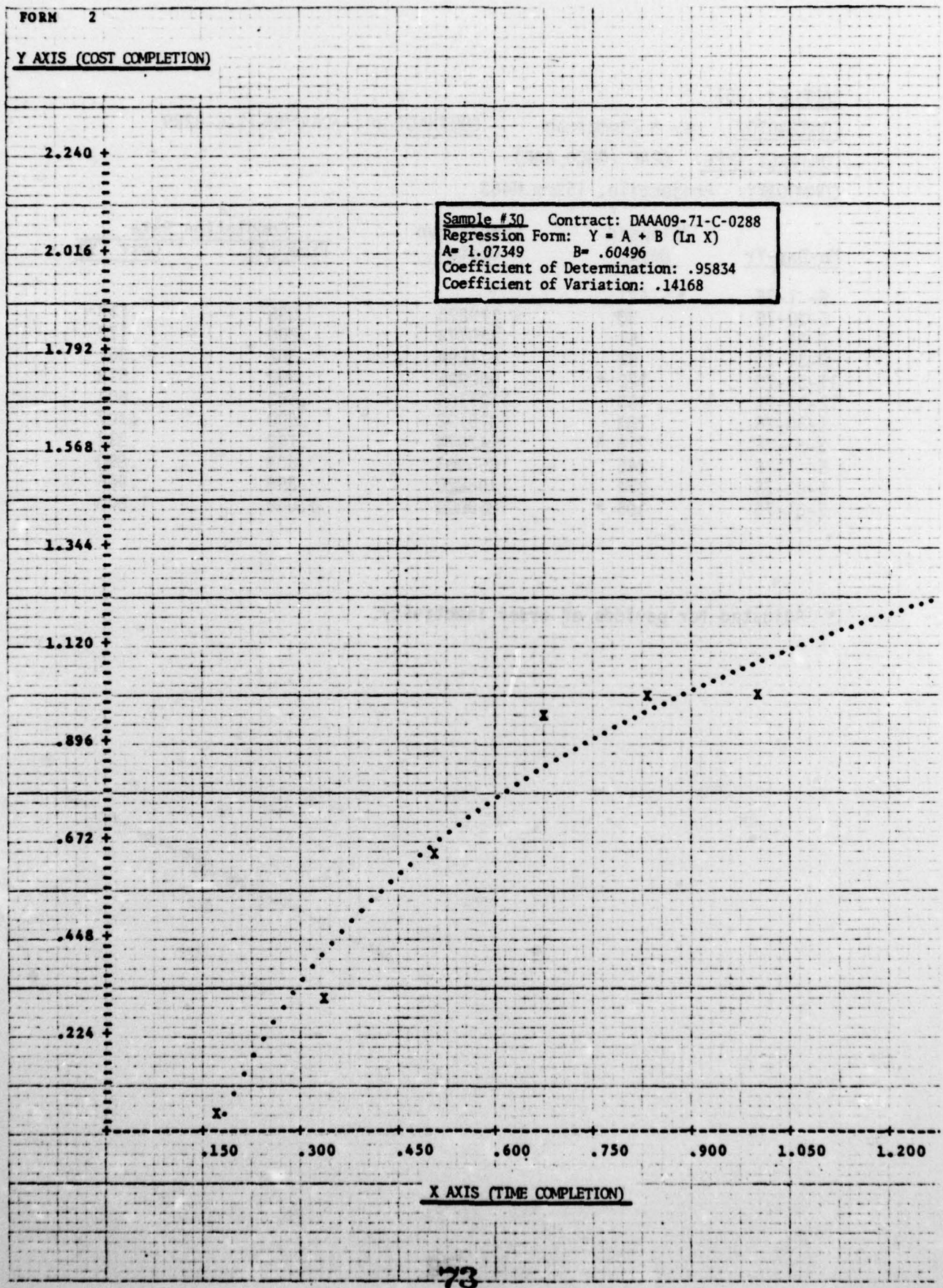
COMMODITY: Load, Assemble,Pack - 60mm HE M49A4 w/Fuze

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
10- 1-75	START			
10-31-75	31 *	$ 65093	.169	.040
11-30-75	61 *	499562	.333	.304
12-31-75	92	1045576	.503	.636
1-31-76	123	1568430	.672	.954
2-29-76	152	1640989	.831	.998
3-31-76	183	1644339	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 2

Y AXIS (COST COMPLETION)



SAMPLE: #31

CONTRACTOR: Day & Zimmerman CONTRACT NO: DAAA09-71-C-0289

CONTRACT TYPE: CPAF (GOCO AAP)

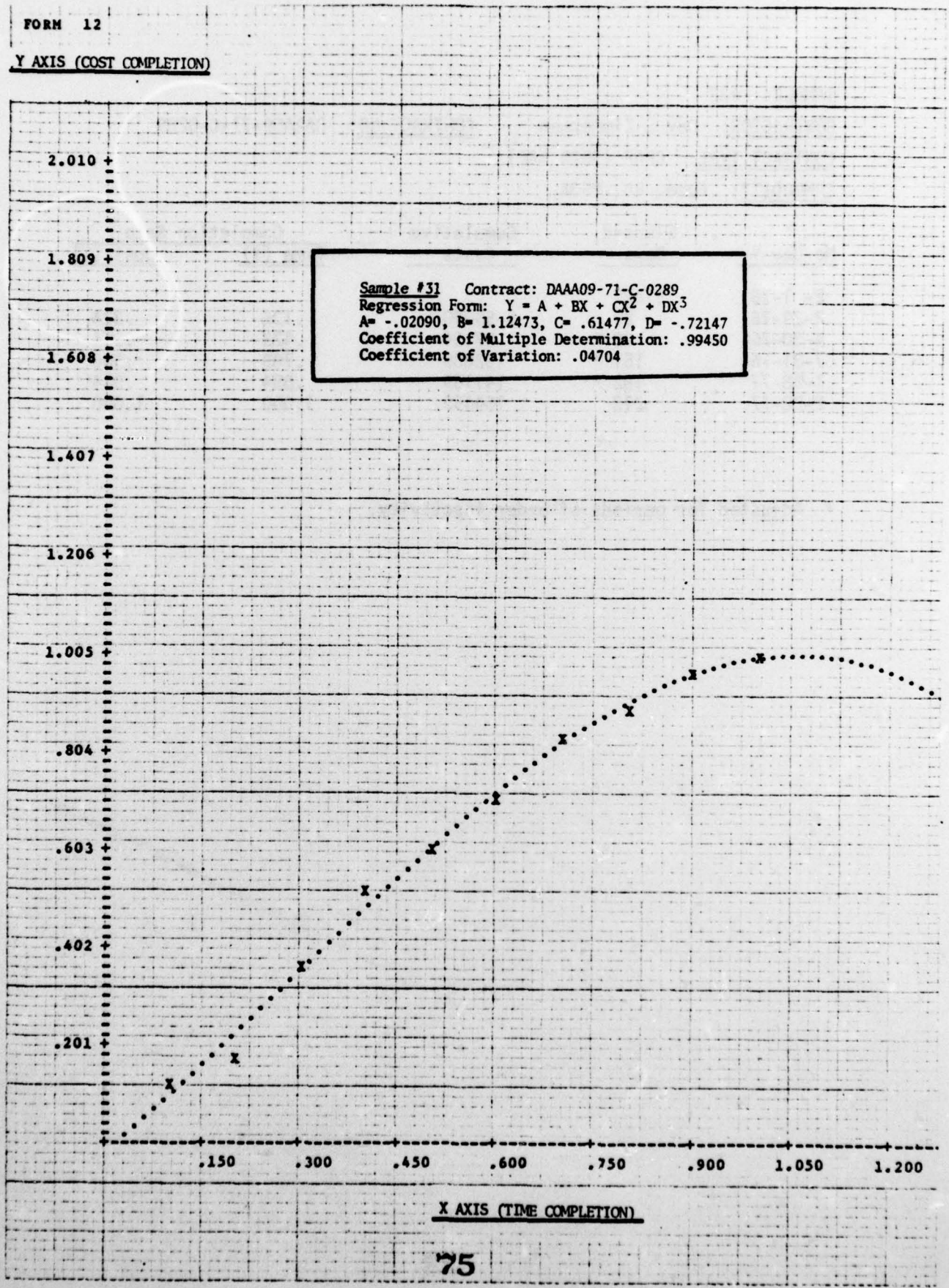
COMMODITY: Projectile, 155mm M483

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
6- 1-75	START			
6-30-75	30	$ 219275	.098	.118
7-31-75	61	320774	.200	.172
8-31-75	92	671894	.302	.361
11-30-75	122 *	962995	.400	.518
12-31-75	153	1121166	.502	.603
1-30-76	183	1315192	.600	.707
3-31-76	214 *	1547974	.702	.832
5- 1-76	245	1655963	.803	.890
5-31-76	274	1796820	.898	.966
7-31-76	305 *	1860000	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 12

Y AXIS (COST COMPLETION)



Sample #31 Contract: DAAA09-71-C-0289
Regression Form: $Y = A + BX + CX^2 + DX^3$
A= -.02090, B= 1.12473, C= .61477, D= -.72147
Coefficient of Multiple Determination: .99450
Coefficient of Variation: .04704

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SAMPLE: #32

CONTRACTOR: Day & Zimmerman CONTRACT NO: DAAA09-71-C-0289

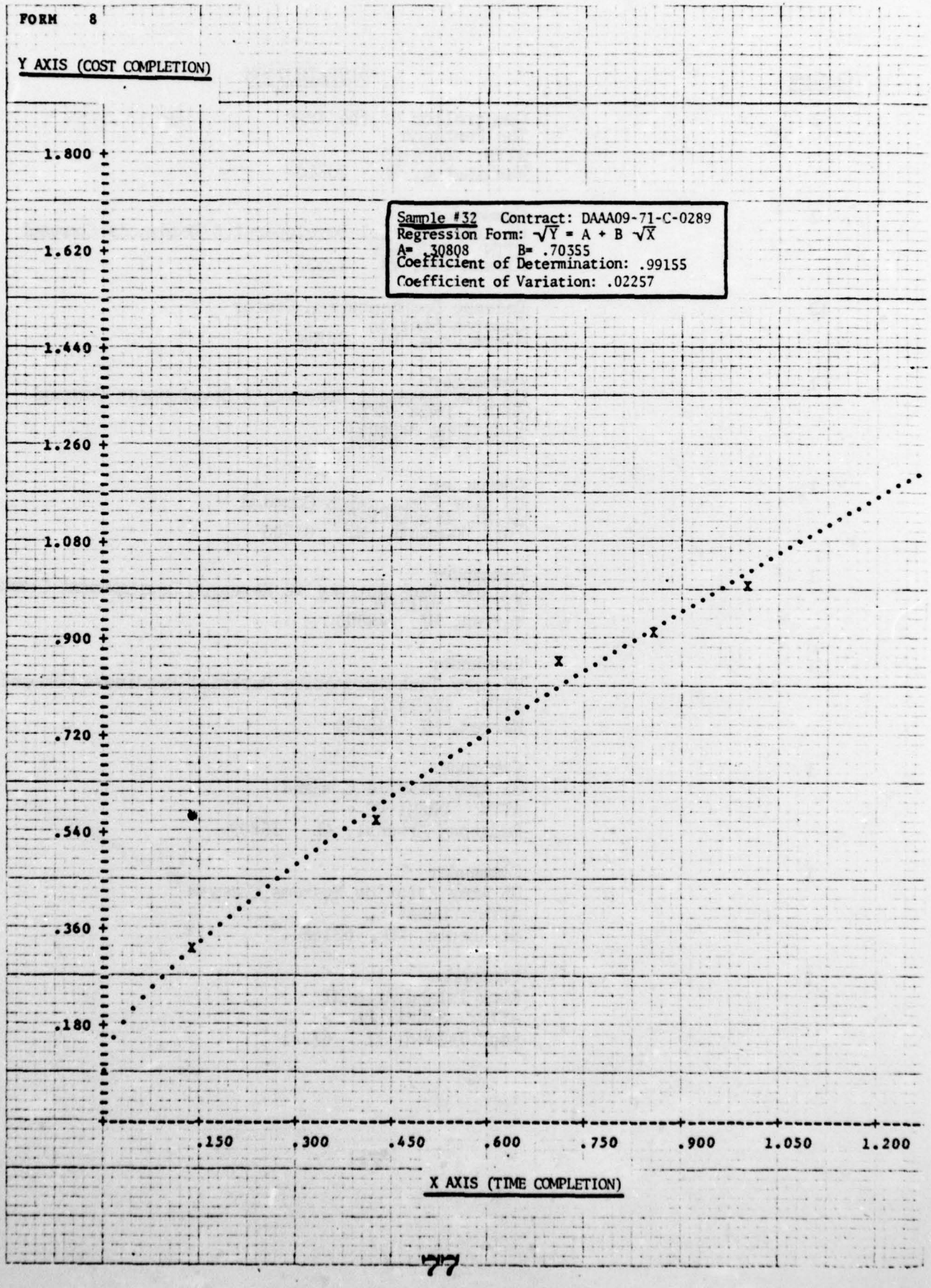
CONTRACT TYPE: CPAF (GOCO AAP)

COMMODITY: Fuze, BD, M534

Mo-Day-Yr	Elapsed Days	Cumulative Costs	Completion Rate Time (X)	Completion Rate Cost (Y)
2- 1-76	START			
2-29-76	29	$ 50000	.136	.324
4-30-76	90 *	87134	.423	.564
7-31-76	151 *	132889	.709	.860
1-28-77	182 *	141169	.854	.914
2-28-77	213	154455	1.000	1.000

* Adjusted for periods of order inactivity.

FORM 8



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13. ABSTRACT

This study provides the results of analyzing cumulative cost incurred patterns on contracts representing a cross-section of Headquarters, US Army Armament Materiel Readiness Command (ARRCOM) commodity-oriented procurements. The study was performed to develop ARRCOM commodity-oriented termination liability table(s) as requested by Headquarters, US Army Materiel Development and Readiness Command. The study provides comparative regression plots for armament products, ammunition products, ARRCOM combined armament/ammunition products, along with the plot of the DOD Termination Liability Table currently being applied by ARRCOM. The termination liability table developed in the study is based upon the ARRCOM combined armament/ammunition products regression analysis.

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