Air Quality Permitting
Technical Memorandum

Tier II Operating Permit and Permit to Construct No. 065-00012

ARTCO
REXBURG, IDAHO

Prepared By:

Kent Berry
Environmental Quality Management

Project No. T2-010502

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PERMIT STATUS:

FINAL PERMIT

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ACRONYMS, UNITS AND CHEMICAL NOMENCLATURE

AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
BACT	Best Available Control Technology
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	emission screening level
EPA	United States Environmental Protection Agency
HAPs	Hazardous Air Pollutants
IDAPA	Idaho Administrative Procedures Act
lb/hr	pound per hour
MACT	Maximum Available Control Technology
MMBtu/hr	million British thermal units
NAAQS	National Ambient Air Quality Standards
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
PSD	Prevention of Significant Deterioration
PTC	permit to construct
SIP	State Implementation Plan
SM	Synthetic Minor
SO_2	sulfur dioxide
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
VOC	volatile organic compound

PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01 Sections 400 through 470, *Rules for the Control of Air Pollution in Idaho* for Tier II Operating Permits and Sections 200 through 228 for Permits to Construct.

PROJECT DESCRIPTION

Artco has requested that they be made a SM source and thus exempt from Tier I permitting. Potential emissions from the facility exceed the major source thresholds of 100 T/yr of volatile organic compounds and 25 T/yr of hazardous air pollutants. However, actual emissions of VOCs from the facility are less than 16 T/yr and actual HAP emissions are approximately 1.5 T/yr.

FACILITY DESCRIPTION

Artco is a printing facility that operates lithographic offset presses, duplicators, and engravers. Their finished products are stationary, cards, invitations, business forms, and other printed material. Several of the presses have thermographers that utilize natural gas for drying inks. There are also several area heaters throughout the facility. All area heaters utilize natural gas only and have a rated heat input of less than 5 MMBtu/hr.

SUMMARY OF EVENTS

• July 31, 2001	The Idaho Department of Environmental Quality (DEQ) received a request from Artco that they be made a SM source.
• December 12, 2001	DEQ determined the application complete.
• July 2, 2002	DEQ issued a proposed Tier II permit for public comment.
• August 9, 2002	The public comment period closed. No comments were received.
• August 26, 2002	DEQ received emission factor references from Artco on the lead re-melter.

DISCUSSION

1. Emission Estimates and Modeling

Actual and potential (prior to limitations imposed by this permit) emissions of criteria pollutants and HAPs, as presented in the application and reviewed by EQ, are summarized in Appendix A. Single source modeling for VOC relative to ozone impacts is not technically feasible; modeling for the lead remelter was conducted using the ISC PRIME model to show compliance with the lead NAAQS. A report on the dispersion modeling analysis is presented in Appendix B. The maximum predicted quarterly concentration based on a throughput limit of 52 tons of lead melted per quarter is 0.21 $\mu g/m^3$, well below the NAAQS of 1.5 $\mu g/m^3$.

The only toxic air pollutant that is likely to exceed the EL in IDAPA 58.01.01.585 is hydroquinone (0.25 lb/hr versus EL of 0.113 lb/hr). This compound is from a single material (G-101P Developer). The SCREEN3 model was run assuming the hydroquinone was emitted from the building ventilation system at roof level. Using the results of the building downwash (cavity) calculation, the maximum one-hour concentration was 14.2 $\mu g/m^3$ compared to the acceptable ambient concentrations of 100 $\mu g/m^3$ (see Appendix C).

2. Area Classification

Located in Madison County, Idaho, Artco is in Air Quality Control Region 61. The area is classified as attainment or unclassifiable for all federal and state criteria air pollutants.

3. Facility Classification

The facility is not a designated facility as defined in IDAPA 58.01.01.006.27. The facility is classified as a SM source because potential emissions fall below major source definitions listed in IDAPA 58.01.01.008.10 as limited in the Tier II permit.

4. Regulatory Review

The following requirements were reviewed in developing this operating permit:

a. IDAPA 58.01.01.205 Prevention of Significant Deterioration (PSD)

The applicant submitted estimates indicating potential emissions for VOC exceeding the PSD threshold of 250 T/yr. Since the facility was built in 1981, the owner should have either applied for a PSD permit or obtained a permit to construct limiting emissions to less than the PSD thresholds.

Under the EPA's "Guidance on the Appropriate Injunctive Relief for Violations of Major New Source Review Requirements," dated November 17, 1998, sources that failed to obtain a PSD permit, but whose actual emissions have never exceeded the PSD thresholds, should be required to meet the requirements for BACT, but are not required to meet other PSD-related requirements. Consequently, this permit limits VOC emissions to 25 T/yr as the retroactive application of BACT. This represents a 92% reduction from the potential emissions of the facility.

b.	IDAPA 58.01.01.401	Tier II Operating Permit
c.	IDAPA 58.01.01.403	Permit Requirements for Tier II Sources
d.	IDAPA 58.01.01.404.01(c)	Opportunity for Public Comment
e.	IDAPA 58.01.01.404.04	Authority to Revise or Renew Operating Permits
f.	IDAPA 58.01.01.406	Obligation to Comply
g.	IDAPA 58.01.01.470	Permit Application Fees for Tier II Permits
h.	IDAPA 58.01.01.625	Visible Emission Limitation
i.	IDAPA 58.01.01.650	General Rules for the Control of Fugitive Dust
j.	IDAPA 58.01.01.677	Particulate Matter from Minor and Existing Fuel-Burning Equipment
k.	40 CFR Part 63, Subpart X	National Emission Standards for Hazardous Air Pollutants for Secondary Lead Smelters

It was determined that these rules are not applicable to the lead remelter at Artco. A secondary lead smelter is defined as any facility at which lead-bearing scrap material, primarily, but not limited to, lead-acid batteries, are recycled into elemental lead by smelting. The affected sources, per 40 CFR 63.541(a), include blast, reverberatory, rotary, and electric smelting furnaces and specifically exclude lead remelters. The NSPS for secondary lead smelters (40 CFR Part 60, Subpart L) is intended to apply to the same types of furnaces.

l. IDAPA 58.01.01.200 et seq. Requirements for Permits to Construct

5. Permit Conditions

a. Emission Limits – VOCs and HAPs

IDAPA 58.01.01.401.01.d authorizes the issuance of optional Tier II operating permits containing *"a potential to emit limitation to exempt the facility from Tier I permitting requirements."* Artco requested to become such a "synthetic minor" source. The only pollutants with the potential to exceed the Tier I permit thresholds are VOCs and HAPs. Thus, the permit limits the rolling 12-month emissions of total HAPs to less than 25 T/yr and individual HAPs to less than 10 T/yr, as determined by monthly calculations based on all VOC-containing materials used. As noted above, VOC emissions are limited to 25 T/yr based on retroactive application of BACT.

b. Emission Limits – Natural Gas Combustion Sources

The natural gas combustion sources at Artco consist of a boiler, area heaters, and thermographers to set thermography powder on some of the offset presses. All are rated at less than 5 MMBtu/hr and are thus considered insignificant under IDAPA 58.01.01.317.01.b(5). Nonetheless, these sources are subject to the 20 % opacity limit in IDAPA 58.08.01.01.625 and 0.015 grains per dry standard cubic feet in IDAPA 58.01.01.677. No monitoring, recordkeeping or reporting conditions are included for these requirements which are addressed in the facility-wide conditions because of the extremely small likelihood of a violation for these minor combustion sources.

c. Throughput Limit for Lead Remelter

Initial SCREEN3 modeling for the lead remelter indicated that the potential emissions would substantially exceed the NAAQS for lead. Since the remelter is operated very intermittently (less than once per week), a throughput limit on the amount of lead melted in a calendar quarter was established to ensure compliance with the NAAQS (see Appendix B). Because there is no control device and the predicted concentration is so far below the NAAQS, no source testing is required. For the same reason, the throughput limit is expressed on a calendar quarter basis (rather than rolling monthly quarters) to simplify recordkeeping.

6. AIRS

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

AIR PROGRAM / POLLUTANT	SIP [c]	PSD [d]	NSPS [e] (Part 60)	NESHAP [f] (Part 61)	MACT [g] (Part 63)	TITLE V	AREA CLASSIFICATION A – Attainment U – Unclassifiable N – Nonattainment
SO_2 [h]	B						A
NO_x [i]	B						A
CO [j]	B						U
PM_{10} [k]	B						U
PM (Particulate) [l]	B						NA
VOC [m]	SM					SM	U
THAP (Total HAPs) [n]	SM					SM	NA
			APPLICABLE SUBPART				

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:
- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 ton-per-year (T/yr) threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

[c] State Implementation Plan
[d] Prevention of Significant Deterioration
[e] New Source Performance Standards
[f] National Emission Standards for Hazardous Air Pollutants
[g] Maximum Achievable Control Technology
[h] Sulfur Dioxide
[i] Nitrogen Oxides
[j] Carbon Monoxide
[k] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[l] Particulate Matter
[m] Volatile Organic Compounds
[n] Hazardous Air Pollutants

FEES

The facility is required to pay retroactive Tier I registration fees in accordance with IDAPA 58.01.01.525 to 538. The facility has satisfied this requirement.

RECOMMENDATIONS

Based on the review of the application materials and all applicable state and federal regulations, staff recommends DEQ issue a final Tier II operating permit and Permit to Construct to Artco. An opportunity for public comment on the air quality aspects of the proposed permit was provided in accordance with IDAPA 58.01.01.404.01.c.

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cc: Jorge Garcia, Idaho Falls Regional Office
Kent Berry, EQM
Joan Lechtenberg, Air Quality Division

APPENDIX A

ACTUAL AND POTENTIAL EMISSIONS FROM ARTCO PRINTING

Executive Summary
Tier II Operating Permit Application
For Artco Printing

General Facility Description

Artco is a printing facility located at 1 Stationary Place, in Rexburg Idaho. The facility utilizes ithographic offset printing presses to produce printed material such as stationary, cards, business forms, magazine inserts and other miscellaneous printed items. Artco is an existing facility that has not previously applied for an air permit.

Emissions from the facility include volatile organic compounds (VOC) and hazardous air pollutants (HAP) from the materials used in the printing operations at Artco. The facility also utilizes natural gas combustion units for building heat and setting powders, which create an embossed affect on printed material. In addition, Artco operates a lead remelter for typesetting operations. Emissions from the lead remelter include lead, particulate matter (PM) and particulate matter less than 10 microns (PM_{10}).

The potential VOC and HAP emissions from Artco exceed the major source thresholds of 100 tons per year for VOC's, 10 tons per year for any single HAP and 25 tons per year (10/25). However, actual emissions from the facility are well under the 100 and 10/25 ton per year major source thresholds. Therefore, the facility is proposing to restrict VOC emissions to less than 99 tons per year and HAP emissions to less than 10/25 tons per year. The facility will demonstrate compliance with these restrictions through monthly record keeping.

Facility Emissions

Potential emissions of VOC's and HAP's from Artco's printing operations exceed the permitting threshold of 100 tons per year for VOC's, and 25 tons per year for all HAP's combined. However, actual estimated emissions of VOC's from the facility are 17.4 tons per year. Also, actual emissions of HAP's do not exceed 10 tons per year for any one HAP or 25 tons per year for all HAP's combined. Table 1 below details the potential and actual emissions from the all emission sources at the facility.

Table 1

Pollutant	Potential Emisssions (lb/yr)	Potential Emissions (tpy)	Actual Emissions (lb/yr)	Actual Emisssions (tpy)
VOC	633,485	317	31,670	15.84
PM	10,408	5.20	362	0.18
PM_{10}	2,672	1.34	91.5	0.05
Cobalt	14,042	7.02	0.0	0.0
Ethylene Glycol	70,246	35.1	264	0.13
Glycol ethers	30,150	15.1	948	0.47

Manganese	14,042	7.02	0	0
Ethylene Thiorurea	86	0.043	35	0.02
Hexane	167	0.083	68	0.03
Hydrochloric Acid	67	0.033	28	0.01
Hydroquinone	2,220	1.11	912	0.46
Methylene Chloride	5	0.003	2	0.00
Toluene	1,152	0.576	473	0.24
Vinyl Acetate	119	0.059	49	0.02
Xylene	421	0.211	173	0.09
Lead	3,504	1.75	52	0.03
Total HAPs	136,221	68.1	3,005	1.50

Emissions of cobalt and manganese were included with potential emissions, but not included with actual emissions. It is believed that the metals contained in the inks are not volatile and the properties are such that nearly 100 percent of the cobalt and manganese will adhere to the paper. Therefore, actual emissions of cobalt and manganese from the inks are recorded as zero.

Table 2 summarizes emissions from the combustion sources at Artco.

Table 2

Pollutant	Potential Emission (lb/yr)	Potential Emissions (tpy)	Actual Emissions (lb/yr)	Actual Emissions (tpy)
PM	596.7	0.298	216.2	0.108
SO_2	47.1	0.024	17.07	0.0085
VOC	432	0.216	156.4	0.078
NOx	7850	3.9	2,844	1.42
CO	6594	3.3	2,389	1.19
PM_{10}	149.2	0.075	54.05	0.027

The natural gas combustion sources at Artco include a boiler and area heaters used for building heat. The small offset presses also utilize natural gas thermographers to set thermography powders which create an embossed affect on the printed material. Emission Factors used for combustion emission calculations were taken from AP 42; Chapter 1.4, Natural Gas Combustion, Table 1.4-1. The heating units, boiler and thermographers have a rated heat input of less than 5 million btus/hr and are considered insignificant per Idaho Administrative Code (IDAPA) 16.01.01(317)(01)(b)(5). Therefore, permit application forms for these units were not included with this permit application. However, emission totals for particulate matter (PM), particulate matter less than 10 microns (PM10) and VOC's include emissions from the combustion sources to determine if combustion source emissions will cause the facility to exceed emission thresholds.

Sample calculations for the combustion units are in Appendix A and a list of equipment and heat input per unit is listed in Appendix B.

Calculations

Potential emissions of VOC's and HAP's from ink were calculated using a Ryobi 2800 for an example.

Maximum Equipment Capacity	9000 sheets/hour
Maximum Print Area	162.75 in^2 (10.5 x 15.5)
Maximum Ink Coverage	1.143 E-6 lb/ in^2
Worst Case Ink VOC Content	40 % VOC
Potential Annual Hours	8760 hours/year

$$162.75\frac{in^2}{sheet}\times 9{,}000\frac{sheets}{hr}\times 1.143E-6\frac{lb\ ink}{in^2}\times 40\% = 0.67\frac{lb}{hour}VOC$$

$$0.67\frac{lb}{hr}\times 8760\frac{hours}{year} = 5866\frac{lb}{year}VOC$$

$$5866\frac{lb}{year}\times\frac{1\ ton}{2000\ lb} = 2.93\frac{tons}{year}VOC$$

Actual Emissions were calculated as follows:

Actual Ink Usage (all presses)	5,000 lbs/year
Worst Case Ink VOC Content	40 %

$$5{,}000\frac{lb\ ink}{year}\times 40\%\ VOC = 2{,}000\frac{lb}{year}VOC$$

Potential emissions from other material were calculated as follows using the Phenoid Instantaneous Type:

Actual Annual Usage	115 gal/year
VOC Content	100 % by weight
PTE Rate Factor	2.43

$$115\frac{gal}{year}\times 100\%\ VOC\times\frac{560{,}640\ hours/year}{230{,}360\ hours/year} = 279.88\frac{lb}{year}VOC$$

The PTE rate factor is a ratio of potential hours of operation to actual hours of operation. To determine the PTE rate factor, the sum of potential hours of operation for all presses was divided by the sum of actual hours of operation for all presses.

Emissions from natural gas combustion were calculated using emission factors from AP-42, Chapter 1.4. Emissions were determined as follows:

PM Emission Factor	7.6 lb/CF6
Total Heat Input From All Thermographers	4.66 MMbtu/hours
Heat Capacity of Natural Gas	1050 MMbtu/CF6

$$4.66\frac{MMbtu}{hour}\times\frac{1\,CF6}{1050\,MMbtu}\times 7.6\frac{lb\,PM}{CF6}\times 8760\frac{hours}{year}=295\frac{lbs}{year}PM$$

Emissions from the lead remelter were calculated using emission factors from the FIRE Database, Version 6.22. The lead remelter is operated approximately one day per week. Emissions were determined as follows:

Lead Emission Factor	0.25 lb/ton melted
Tons melted per Charge	4.0 tons per charge
Actual Batches per Day	1.0 batches/day
Actual Batches per Year	52 batches per year

$$4.0\frac{tons}{batch}\times\frac{0.25\,lb\,lead}{ton\,melted}\times 52\frac{batches}{year}=52\frac{lb}{year}Lead$$

Potential emissions from the lead remelter were calculated assuming that each 4 ton batch of lead takes 2.5 hours to melt. If the remelter were to run continuously, Artco could run 9.6 batches per day, (24/2.5), and 365 days per year. Potential emissions from the remelter were calculated as follows:

Lead Emission Factor	0.25 lb/ton melted
Tons melted per Charge	4.0 tons per charge
Actual Batches per Day	9.6 batches/day
Actual Batches per Year	3504 batches per year

$$4.0\frac{tons}{batch}\times\frac{0.25\,lb\,lead}{ton\,melted}\times 3504\frac{batches}{year}=3504\frac{lb}{year}Lead$$

APPENDIX B

REPORT ON DISPERSION MODELING ANALYSIS FOR ARTCO LEAD REMELTER

1. SUMMARY:

Because initial SCREEN3 modeling for the lead remelter at Artco indicated that potential emissions would substantially exceed the NAAQS for lead (Pb), a more sophisticated modeling analysis was conducted of the intermittent operation of the remelter. Figure 1 shows the approximate location of the ARTCO site. Dispersion modeling using the Industrial Source Complex Model including PRIME for building downwash was performed for lead emissions associated with the remelting operations. The modeling demonstrated compliance with the NAAQS.

2. DISCUSSION:

2.1 Applicable Air Quality Impact Limits

This facility is located in Rexburg, Idaho which is designated an attainment or unclassifiable area for Pb. Therefore, the ambient impact for this criteria pollutant must be below the applicable NAAQS. The dispersion modeling analysis compared facility impacts (including background concentration) to the regulatory limits listed in Table 1.

Table 1. Applicable Regulatory Limits for ARTCO in Jolley, Idaho

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)
Pb	Quarterly	1.5

2.2 Background Concentrations

When conducting NAAQS modeling for non-PSD sources (i.e., ARTCO), sources not explicitly included in the model are taken into account by adding a background concentration. Table 2 lists background concentrations provided by DEQ to the Rexburg area.

Table 2. Ambient Air Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)
Pb	Quarterly	0.15

Source: DEQ

2.3 Modeling Impact Assessment

The procedures in the State of Idaho's *Air Quality Modeling Guideline* (DEQ 2002), as well as the EPA documents *Guideline on Air Quality Models* (EPA 1996) were followed in conducting the modeling analysis.

The Industrial Source Complex Model (ISC), including the Plume Rise Model Enhancements Model (PRIME), version 99020, was used in the NAAQS compliance evaluation. All regulatory default options were used in the modeling. The area surrounding the facility within 3 kilometers is rural in nature and thus, the rural option was selected for all modeling analysis.

The remainder of the modeling analysis describes the emission rates, source parameters, building dimensions, determination of ambient air, receptor locations, terrain elevation data, meteorological data, and compliance evaluation.

The long-term average Pb emissions for the single stack associated with the remelter operations are shown in Table 3. The stack information for the stack are presented in Table 4. The methodology for

modeling quarterly averaging periods incorporated the remelting operations duration of four (4) hours per week over each quarter. Thus, the emission rate represents the quarterly averaged emission rate expressed as pounds per hour.

Table 3. Quarterly Emissions Used in Modeling for ARTCO

Emissions Source	Source ID	Period of Emissions	Pb
Remelter Stack	-	Annual Emissions (lb/yr)	52
		Quarterly Emissions (lb/h)	0.00594

Table 4. Stack Parameters Used in Dispersion Modeling With Permit Conditions for ARTCO in Jolley, Idaho

Source	Height (ft)	Diameter (ft)	Velocity (ft/s)	Flow Rate (acfm)	Temp. (°F)	UTMx (m)	UTMy (m)	Elevation (ft)
Remelter	30	1.42	30.65	2,900	127	437,516	4,854,778	4,870

The printing operations building was included in the analysis to include the effects of building downwash on the released emissions which may influence the plume (which will tend to bring the plume closer to the ground near the structures). The dimensions of the building were 100m north-south, 110m east-west, and 7.62m in height. The elevation and location of each building at the facility was used in the U.S. EPA's Building Profile Input Program-PRIME (95086) to calculate the building downwash parameters to be used in the ISC-PRIME Model. Figure 2 presents the stack-building configuration used in the modeling.

The ambient air boundary for this analysis included areas within and near the property boundary. To account for this definition of ambient air in the vicinity of the ARTCO remelter, several receptor grids in various resolutions were used to define potential receptor locations around the facility. The only area excluded from consideration was the top of the ARTCO operations building itself. Three sets of nested Cartesian grids were arranged around the facility: an inner grid spaced at 50 m intervals and extending to 300 m from the source; a 100 m grid extending to 1000 m; and a 250 m grid extending to 5000. All maximum impacts occurred within the 50 m grid. A total of 2,161 receptors were modeled. The elevations of each receptor were derived from 30m resolution Digital Elevation Model (DEM) 7.5-minute quadrangle maps for the area. Figure 3 presents the overall modeling grid.

Per discussions with DEQ, the closest applicable surface data meteorological station to the ARTCO site is in Pocatello, Idaho (NWS Station No. 24156). These data were combined with Boise's upper air meteorological data in the PCRAMMET meteorological preprocessor for years 1986-1991. All data were obtained from the most recent 5-year data set from EPA's SCRAM website.

3. MODELING RESULTS FOR Pb

The results presented in Table 5 show that the ambient air impacts due to this project and including background concentrations are below the NAAQS for all pollutants.

Table 5. NAAQS Impact Analysis Summary For ARTCO

Pollutant	Averaging Period	Total Ambient Impact, $\mu g/m^3$	Ambient Background Concentration, $\mu g/m^3$	Total NAAQS Concentration, $\mu g/m^3$	NAAQS, $\mu g/m^3$	Percent of NAAQS, %
Pb[a]	Quarterly	0.064	0.15	0.214	1.5	14%

c. Compliance based on maximum concentration at each receptor

4. REFERENCES:

DEQ, 2002. Idaho Department of Environmental Quality, 2002. *State of Idaho Air Quality Modeling Guideline*, Boise, Idaho, May.

EPA, 1996. U.S. EPA, 2001. 40CFR51 – *Requirements for Preparation, Adoption, and Submittal of State Implementation Plans (Guideline on Air Quality Models, Appendix W).*

Figure 1. Location of ARTCO in Jolley, Idaho

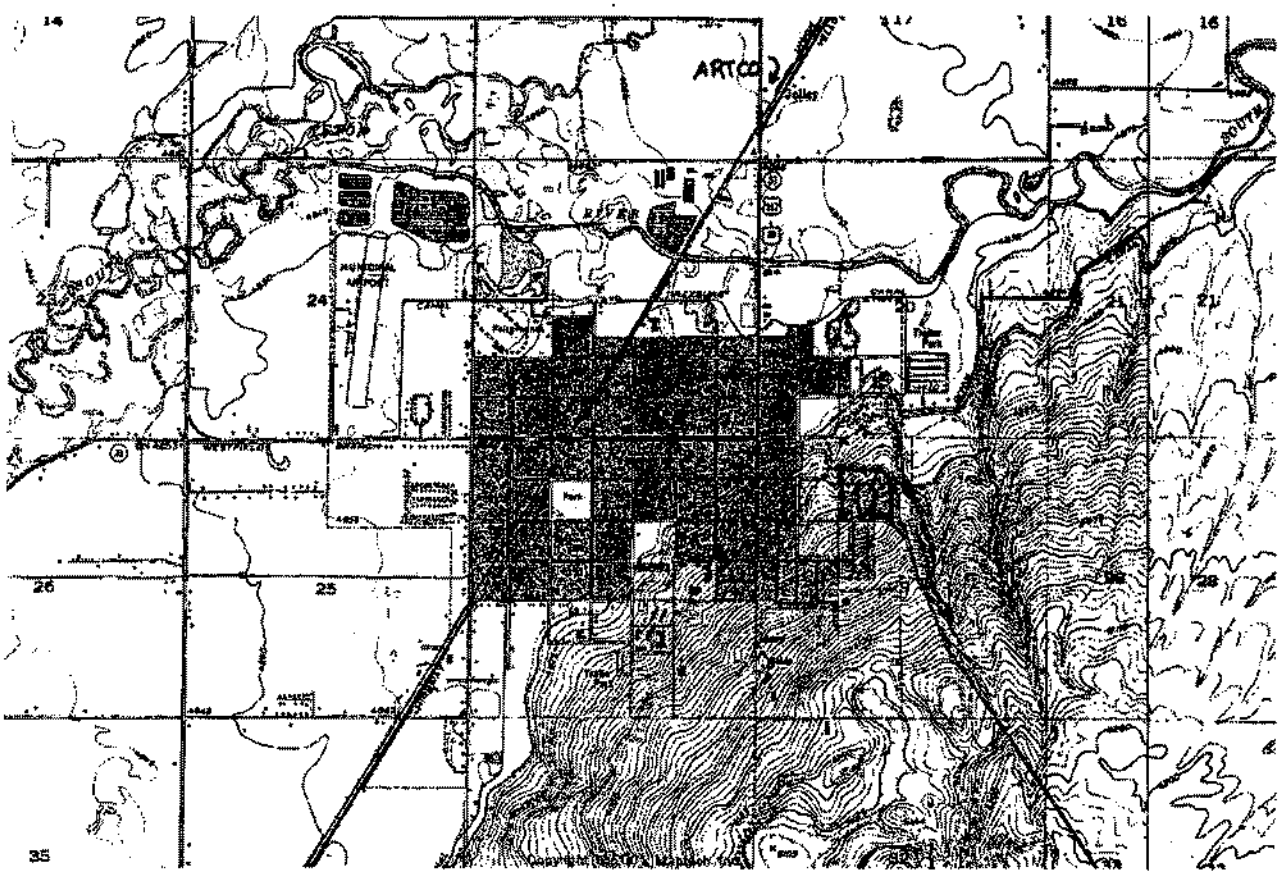


Figure 2. ARTCO STack-building Configuration

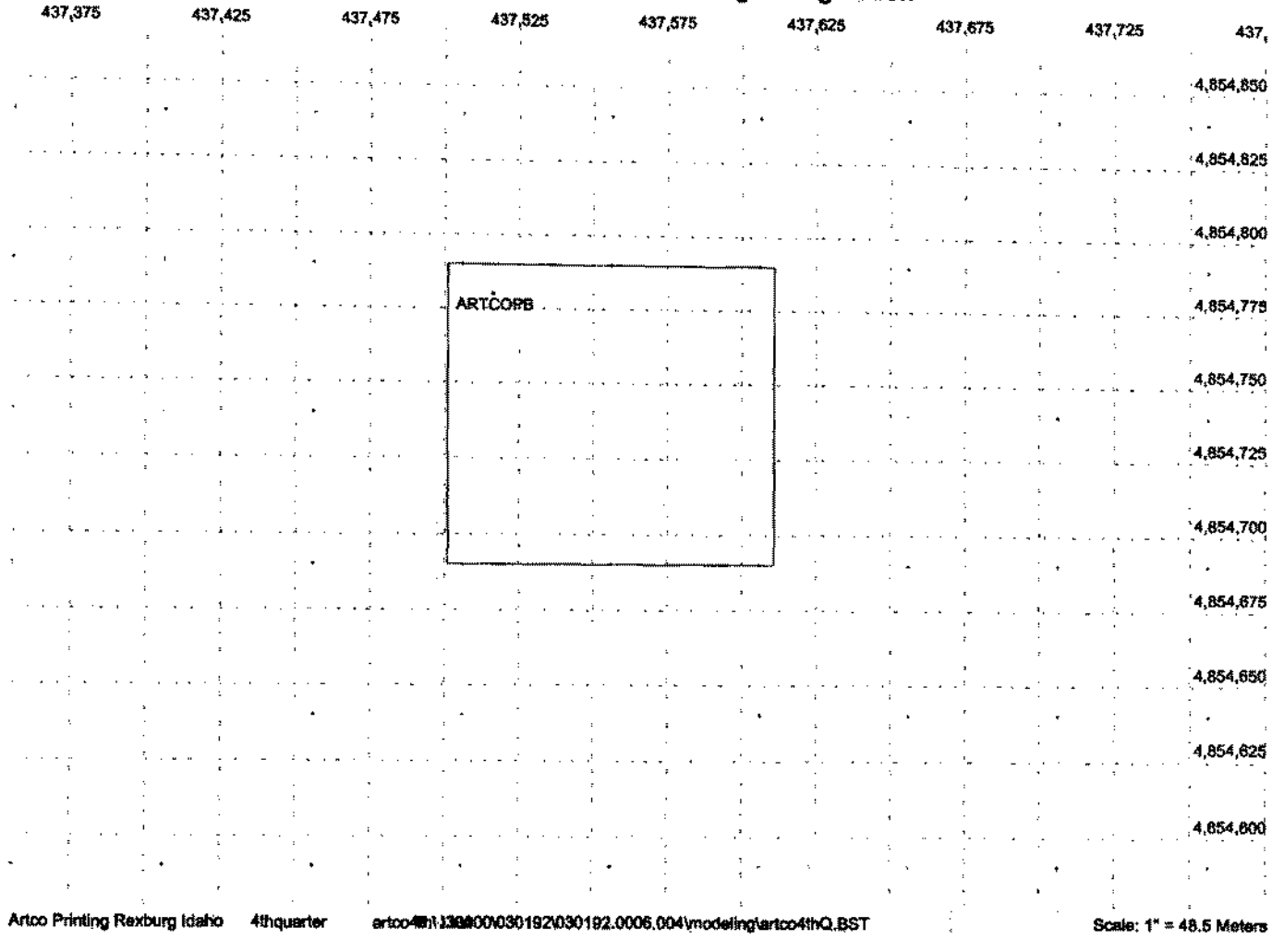
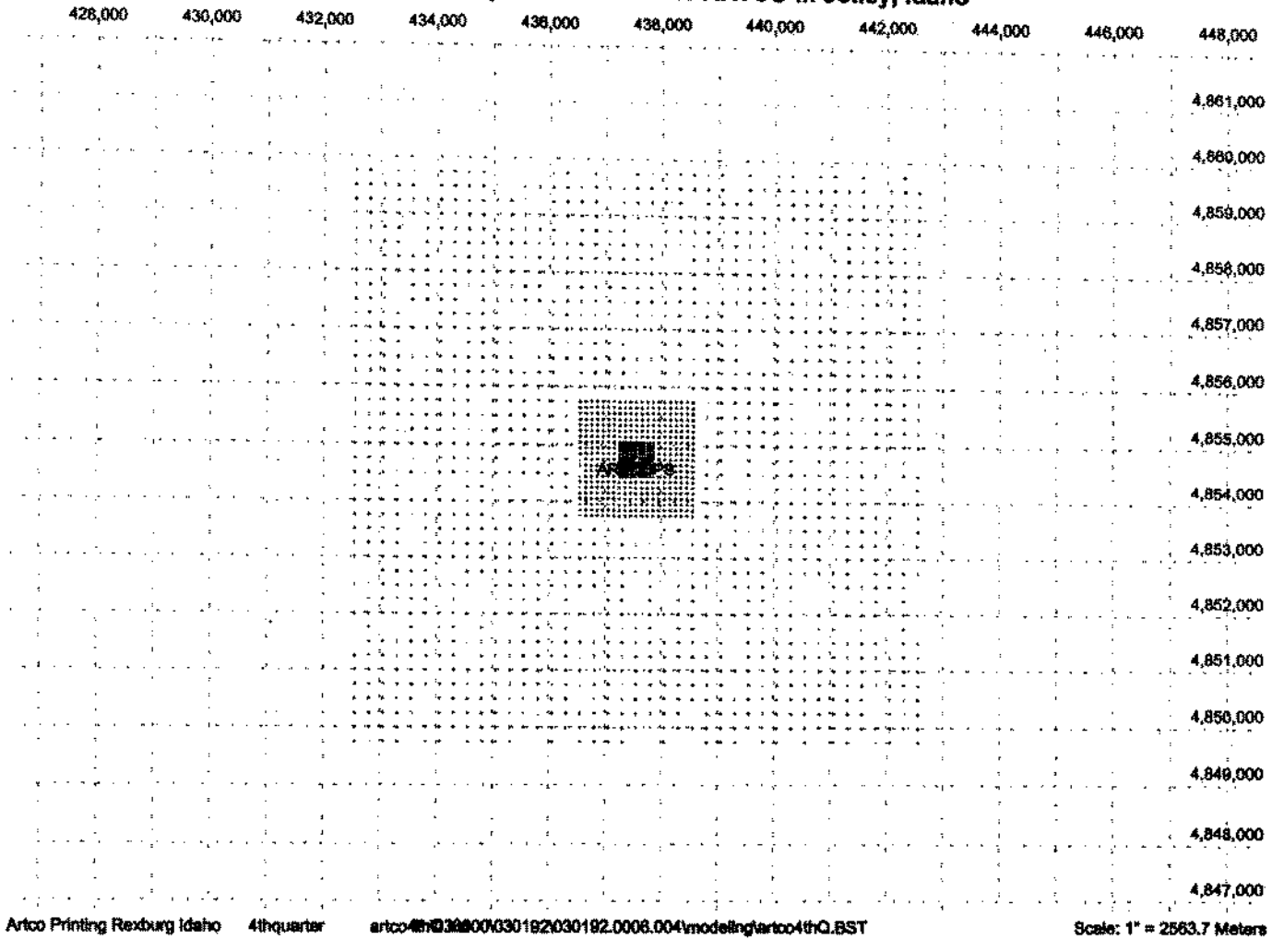


Figure 3. Receptor Grid Used for ARTCO in Jolley, Idaho



APPENDIX C

MODELING RESULTS FOR HYDROQUINONE FROM ARTCO PRINTING

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*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Artco Hydroquinone

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
RECEPTOR HEIGHT (M)	=	0.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	7.6200
MIN HORIZ BLDG DIM (M)	=	100.5840
MAX HORIZ BLDG DIM (M)	=	109.7280

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .027 M**4/S**3; MOM. FLUX = 1.934 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	0	.0	.0	.0	.00	.00	.00	NA
100.	123.1	6	1.0	1.0	10000.0	9.34	4.07	6.02	SS
200.	79.26	6	1.0	1.0	10000.0	9.34	7.73	7.42	SS
300.	57.74	6	1.0	1.0	10000.0	9.34	11.23	8.75	SS
400.	44.29	6	1.0	1.0	10000.0	9.34	14.64	10.03	SS
500.	35.53	6	1.0	1.0	10000.0	9.34	17.97	10.84	SS
600.	29.17	6	1.0	1.0	10000.0	9.34	21.24	11.90	SS
700.	24.45	6	1.0	1.0	10000.0	9.34	24.46	12.91	SS
800.	20.85	6	1.0	1.0	10000.0	9.34	27.63	13.88	SS
900.	18.25	6	1.0	1.0	10000.0	9.34	30.78	14.52	SS
1000.	16.01	6	1.0	1.0	10000.0	9.34	33.88	15.37	SS
1100.	14.19	6	1.0	1.0	10000.0	9.34	36.96	16.19	SS
1200.	12.68	6	1.0	1.0	10000.0	9.34	40.01	16.99	SS
1300.	11.42	6	1.0	1.0	10000.0	9.34	43.04	17.76	SS
1400.	10.35	6	1.0	1.0	10000.0	9.34	46.05	18.52	SS
1500.	9.441	6	1.0	1.0	10000.0	9.34	49.03	19.26	SS
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:									
23.	230.6	6	2.0	2.0	10000.0	7.73	1.08	4.41	SS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

```
*****************************************
     *** REGULATORY (Default) ***
    PERFORMING CAVITY CALCULATIONS
  WITH ORIGINAL SCREEN CAVITY MODEL
          (BRODE, 1988)
*****************************************
```

*** CAVITY CALCULATION - 1 ***			*** CAVITY CALCULATION - 2 ***		
CONC (UG/M**3)	=	13.02	CONC (UG/M**3)	=	14.21
CRIT WS @10M (M/S)	=	3.86	CRIT WS @10M (M/S)	=	3.86
CRIT WS @ HS (M/S)	=	3.86	CRIT WS @ HS (M/S)	=	3.86
DILUTION WS (M/S)	=	1.93	DILUTION WS (M/S)	=	1.93
CAVITY HT (M)	=	7.62	CAVITY HT (M)	=	7.62
CAVITY LENGTH (M)	=	41.74	CAVITY LENGTH (M)	=	40.94
ALONGWIND DIM (M)	=	100.58	ALONGWIND DIM (M)	=	109.73

```
*****************************************
      END OF CAVITY CALCULATIONS
*****************************************
```

```
     ****************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ****************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
SIMPLE TERRAIN	230.6	23.	0.	
BLDG. CAVITY-1	13.02	42.	--	(DIST = CAVITY LENGTH)
BLDG. CAVITY-2	14.21	41.	--	(DIST = CAVITY LENGTH)

```
*****************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
*****************************************************
```